RigPi Station Server Version 4

USER MANUAL

Howard Nurse, W6HN

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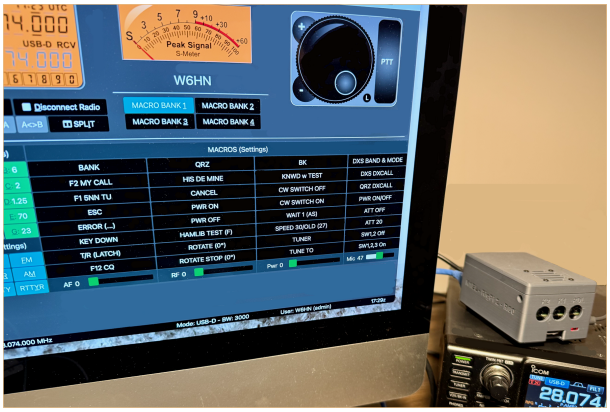
RigPi Introduction

1 RigPi Introduction

MFJ-1234D
RigPi™ Station Server v 4.0



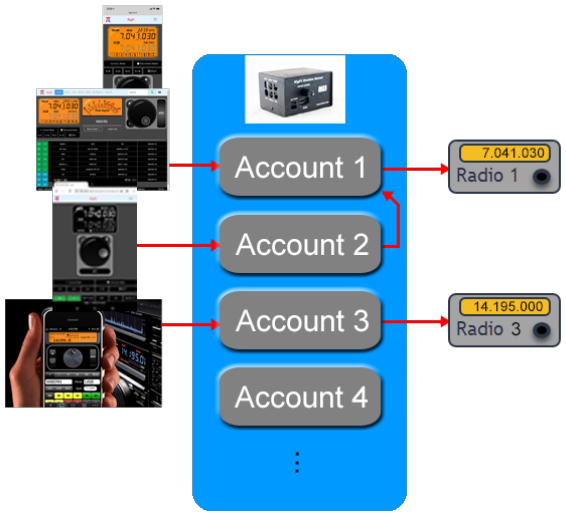
RigPi is a product developed by MFJ Enterprises, a company specializing in amateur radio equipment. RigPi is a remote control system designed to allow remote operation and control of amateur radio stations. It consists of hardware and software components that enable remote access to your radio equipment from a computer, tablet, or smart phone.

The core of RigPi is a Raspberry Pi computer, which acts as a central control unit. It connects to your radio equipment and provides a web-based interface for remote control and monitoring. The software includes features such as virtual control panels, audio streaming, logging capabilities, and integration with popular logging and digital mode software.

RigPi allows amateur radio operators to operate their stations from a remote location, enabling them to access and control their equipment over the internet. This can be especially useful for operators who want to operate their stations while away from home or for those who wish to share their equipment with others.

--chatGPT

RSS Block Diagram

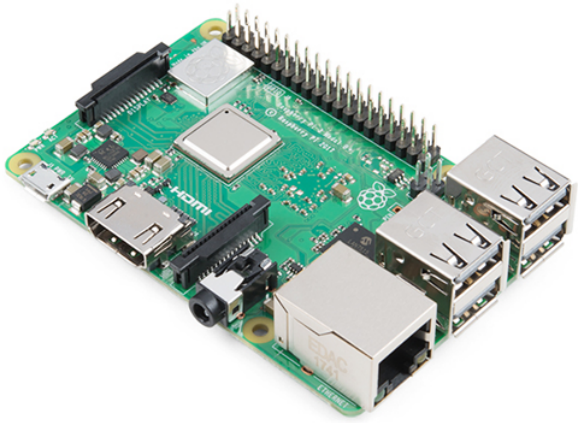


Account	Controlled Radio	Controlled By
Account 1	Radio 1	iPad and iPhone
Account 2	Radio 1 through Account 1	Google Nexus
Account 3	Radio 3	iPhone using CommCat Mobile (now discontinued)
Account 4	Not used	None

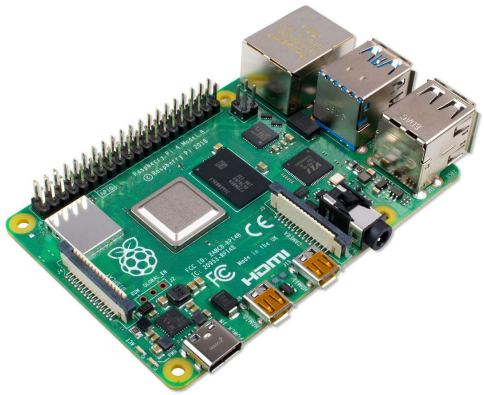
1.1 Welcome to RSS

Welcome to RigPi Station Server!

RigPi Station Server (RSS) is an easy-to-use multi-operator, multi-radio (MOMR) amateur radio control, logging, CW keying, spot management and call lookup system.



Raspberry Pi 3 B+



Raspberry Pi 4 B

RSS is based on a Raspberry Pi computer running Linux plus RigPi CW Keyer and RigPi Audio boards. RigPi Keyer uses the popular K1EL WinKeyer chip for keyboard or paddle input. RigPi Audio is used for Voice-Over IP (VoIP) and remote operations, or for digital modes and I/Q spectral display (panadapter).

The MFJ-1234 uses the Raspberry Pi 3B+ while the MFJ-1234B/C uses the 4B. The RigPi 4 image runs on either, but NOT a Raspberry Pi 5. The Raspberry Pi is a small computer providing processing, 2-8 GB RAM, four USB ports, Ethernet port, Wi-Fi and Bluetooth. The RigPi Keyer and RigPi Audio boards are connected through Raspberry Pi GPIO connectors.

MFJ no longer manufactures RigPi although they continue to provide software downloads as of August 2025.

RigPi's may be available on secondary markets such as QRZ.com and eBay.

The RSS user interface is browser based. Radio control is through a browser, no other apps are required for control. It can be used with any Internet browser including those on Windows, Mac, Chromebook, Android, iOS and Linux computers, laptops, and phones. You can open RSS

web pages on several devices at once. Because RSS is multi-radio, one browser can control one radio and a second browser can control the same or another radio.

Many Windows logging programs can control RigPi using a free Windows program called RigPi Hub.

One RigPi can connect to a second RigPi through the Internet. The second RigPi is ideal for portable use.

RSS radio control uses Hamlib, a library of over 200 radio models and 30 rotors. As new radios and rotors are added you can update the Hamlib library to keep current.

Other programs are provided with RSS for ham radio and general use. Fldigi and WSJT-X provide a wide range of digital modes. TQSL prepares and uploads log files to ARRL LoTW. Additional software can be added to replace programs on a desktop PC, including an email client, and Office software including word processing, paint, spreadsheet, and database programs. You can even play games on RSS!

RSS uses open source HTML5, PHP7, jQuery and Ajax, and MySQL (MariaDB). The Tuner graphics panels: frequency; s-meter; LED display; and tuning knob, were created using proprietary tools and are provided as closed source under a distribution license. RSS uses Twitter Bootstrap to create responsive web pages. You can easily view and modify RSS programs to make changes or add your own features. No specialized software coding tools are required.

Remote or Local?

When RigPi is used for remote operations, there is a question of which is the remote and which is the local site. RigPi uses the convention that the transmitter (home) site is local and the operator site is remote.

1.2 Quick Start Guide

What is Needed

1. RigPi Station Server (RSS)
    a. A Raspberry Pi 3B+ or Raspberry Pi 4B*
    b. 5.1-volt, 3-amp Power Supply with a microUSB connector if using a Raspberry Pi 3B+ or a USB-C connector if using a Raspberry Pi 4B.
    c. An Ethernet cable or Wi-Fi Internet connection to your router

d. Another computer or mobile device on the same network, or

e. A monitor with an HDMI connector for the Raspberry Pi 3B+ or a micro HDMI connector for a Raspberry Pi 4B. USB keyboard and USB mouse

f. For remote operations, a browser and Mumble VoIP client on your mobile device

2. Ham Radio Transceiver

a. CAT connection for computer control

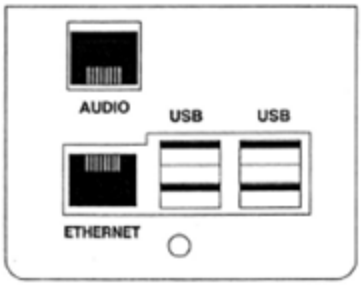
b. CAT USB interface cable (or serial-to-USB adapter)

c. Audio cables for VoIP or digital mode software (or a radio with internal audio CODECs), CW and PTT keying cables.

*Note: the MFJ-1234 cabinet for the Raspberry Pi 3B+ is not compatible with the Raspberry Pi 4B because of connector locations.

Connecting RSS to the Internet (Ethernet Connection)

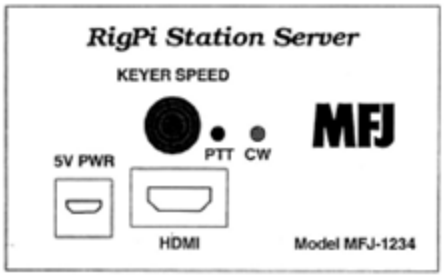
The drawings below are for the MFJ-1234 which uses a Raspberry Pi3B+ board. The MFJ-1234B/C have a slightly different design to accommodate the connectors on a Raspberry Pi 4B.



AUDIO uses same jumper blocks and cables as MFJ-1204

USB USB2 connections on Raspberry Pi3 board
ETHERNET Raspberry Pi 3 Ethernet connection on board.

1. Connect an Ethernet cable from your router to RigPi Station Server.



5V PWR 5V supply line.
HDMI HDMI video only. Audio disabled.

2. Plug in the RSS 5.1-volt power supply.

   The two lights below the RSS KEY jack indicate power (red) and activity (green). The green light blinks as RigPi boots. The red light should not blink ecept once during booting. If it does, your power supply may be underrated or faulty.

3. On another computer or mobile device connected to the same network, open a browser window. Navigate to rigpi4.local.

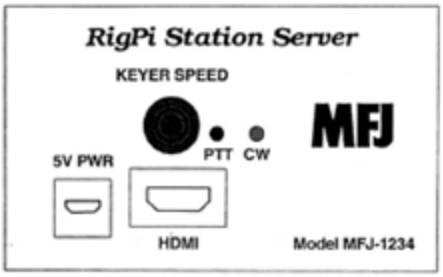
   Apple Bonjour is required on Windows computers to find rigpi4.local. See the Technical topic in Help for more information on Bonjour.

   Without Bonjour, you can use the RigPi IP address instead. Log in to your router and look at connected devices. You will see the Raspberry Pi listed there along with its IP address.

4. The RSS Login screen appears after RSS has completed the boot process. (See below.)

Connecting RSS to the Internet (Wi-Fi Connection)

RSS has built-in Wi-Fi if an Ethernet cable isn't convenient. If you need to connect using Wi-Fi rather than using an Ethernet connection, a monitor/keyboard/mouse must be connected to RSS to set it up.



5V PWR 5V supply line.
HDMI HDMI video only. Audio disabled.

1. Connect a computer monitor having an HDMI input (micro HDMI input if using a Raspberry Pi 4B), USB keyboard and USB mouse to RSS.

2. Plug in the RSS 5.1-volt power supply.

   The two lights below the RSS KEY jack indicate power (red) and activity (green). The green light blinks as RigPi boots. The red light should not blink except once during boot. If it does, the power supply may be underrated or faulty.

3. The Raspbian PIXEL Desktop appears after RSS has completed the boot process.

4. In the upper-right corner of the Desktop click the Network icon (Up/Down arrow).

5. Select Turn on Wi-Fi, then click the Network button again.

6. Select the network you wish to join from the list.
7. In the Pre Shared Key box enter your Wi-Fi password, then click OK.
8. While the Desktop is open, click the Raspberry Menu icon and navigate to Preferences>Raspberry Pi Configuration>Localization.
9. Enter the Locale, Timezone, Keyboard and Wi-Fi Country for your location.
10. Click the RSS icon (a Pi symbol) to start RSS. The RSS Login screen appears.

Set Screen Resolution (for VNC connection to desktop)

To change the VNC desktop to a higher or lower resolution, a Screen Configuration program is provided with Bullseye. Open the Application menu on the desktop and go to Preferences>Screen Configuration. In the Configuration window go to Configure->Screens>HDMI-1>Resolution and select the resolution you wish to use. Go to Configure->Apply to set the resolution.

Set Screen Resolution (for HDMI connection to desktop)

To set the HDMI resolution on a Raspberry Pi running the Bullseye distribution, follow these steps:

1. Open the terminal on your Raspberry Pi or connect to it remotely using SSH.

2. Edit the configuration file for the HDMI settings using the following command:

```
sudo nano /boot/config.txt
```

3. Look for the lines related to HDMI settings. Scroll down or use the arrow keys to navigate. You should see lines starting with `hdmi_group` and `hdmi_mode`.

4. Uncomment the desired `hdmi_group` and `hdmi_mode` lines by removing the '#' character at the beginning of each line. Refer to the official Raspberry Pi documentation for the available HDMI modes and their corresponding values.

5. Once you have uncommented the desired lines, save the changes by pressing Ctrl + X, then Y, and finally Enter to confirm.

6. Reboot the Raspberry Pi for the changes to take effect. You can reboot by running the following command:

```
sudo reboot
```

After the reboot, the HDMI resolution should be set according to the values you specified in the `config.txt` file.

Connecting your Radio

RigPi controls the frequency and mode of your radio through a CAT (Computer Aided Tuning) connection to a USB port. Most modern radios provide a USB connection which require a USB A-B cable. Older radios have a variety of connection requirements, although each manufacturer is usually consistent from one radio to another. Check the manual for your radio for specifics on what type of cable is required.

Manufacturer	Older Model CAT Connection
Kenwood	DB9 Serial, requires serial-to-USB adapter
Icom	CI-V 3.5mm, requires CI-V-to-USB adapter
Yaesu	DB9 Serial, requires serial-to-USB adapter. Older Yaesu radios also require a level converter.

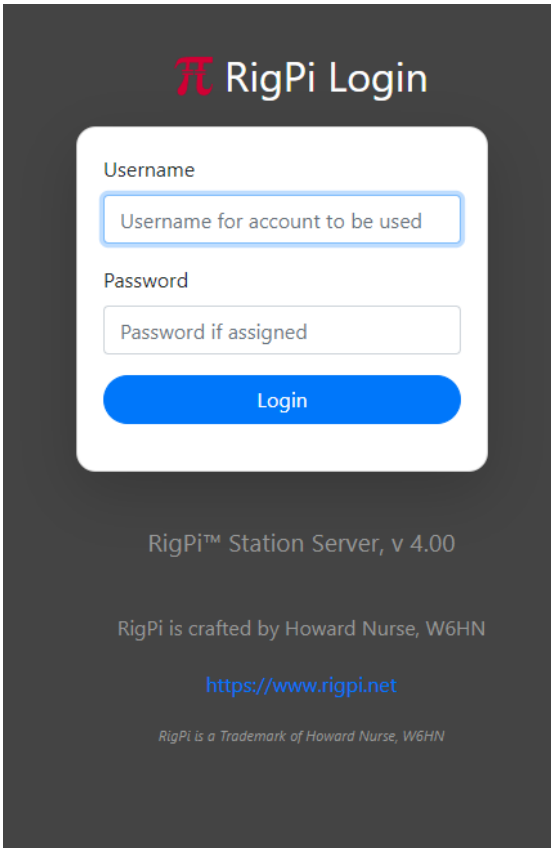
Audio connections to your radio are covered later in this manual. CW Keying requires either a cable between the KEY jack on RSS and your radio's keying input (more later), or CAT control.

Accessing RigPi

RigPi 4 is accessed by entering rigpi4.local in a browser's navigation bar. If your browser can't find rigpi4.local, it may be necessary to install Bonjour on your computer. See Bonjour Help 179 elsewhere in this manual for details. Alternatively you can use the IP address of RigPi 4 as found in the list of connected devices in your router.

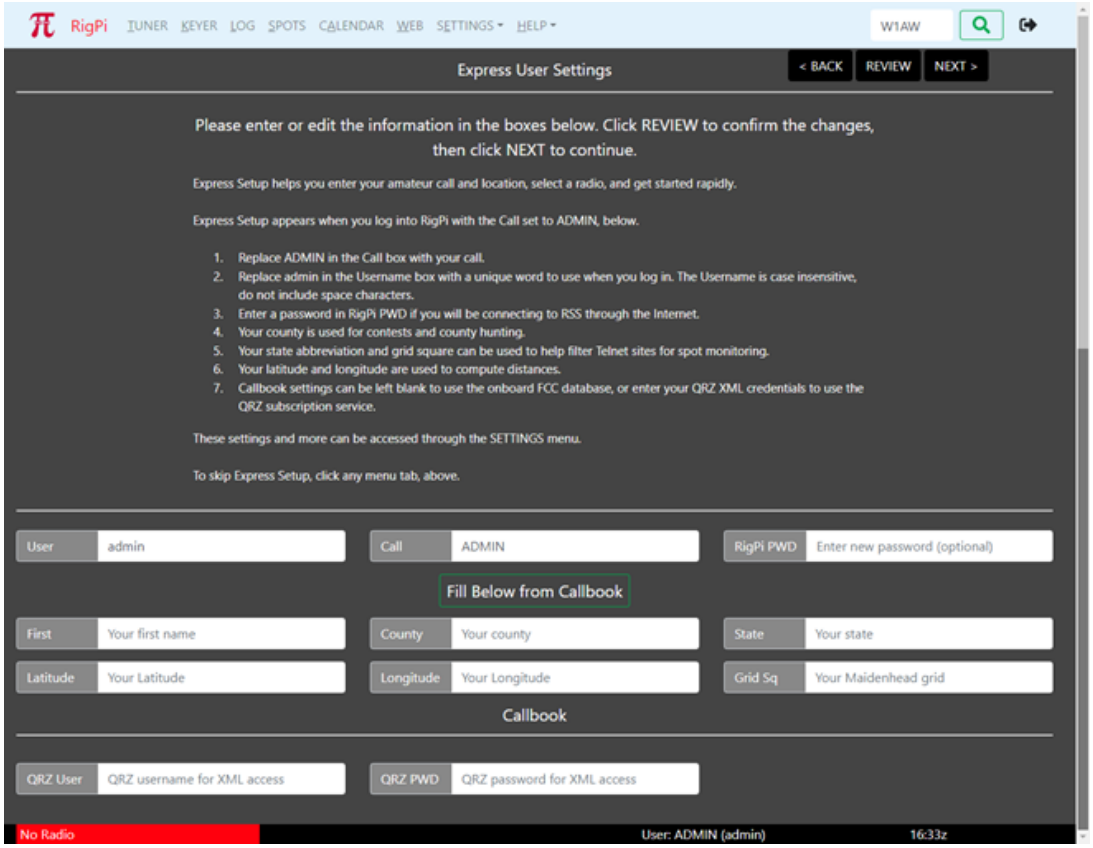
Exploring RSS, Startup Windows

The RigPi Login screen is shown below. If you have set up a schedule for rig use, additional information will be shown on the Login window.

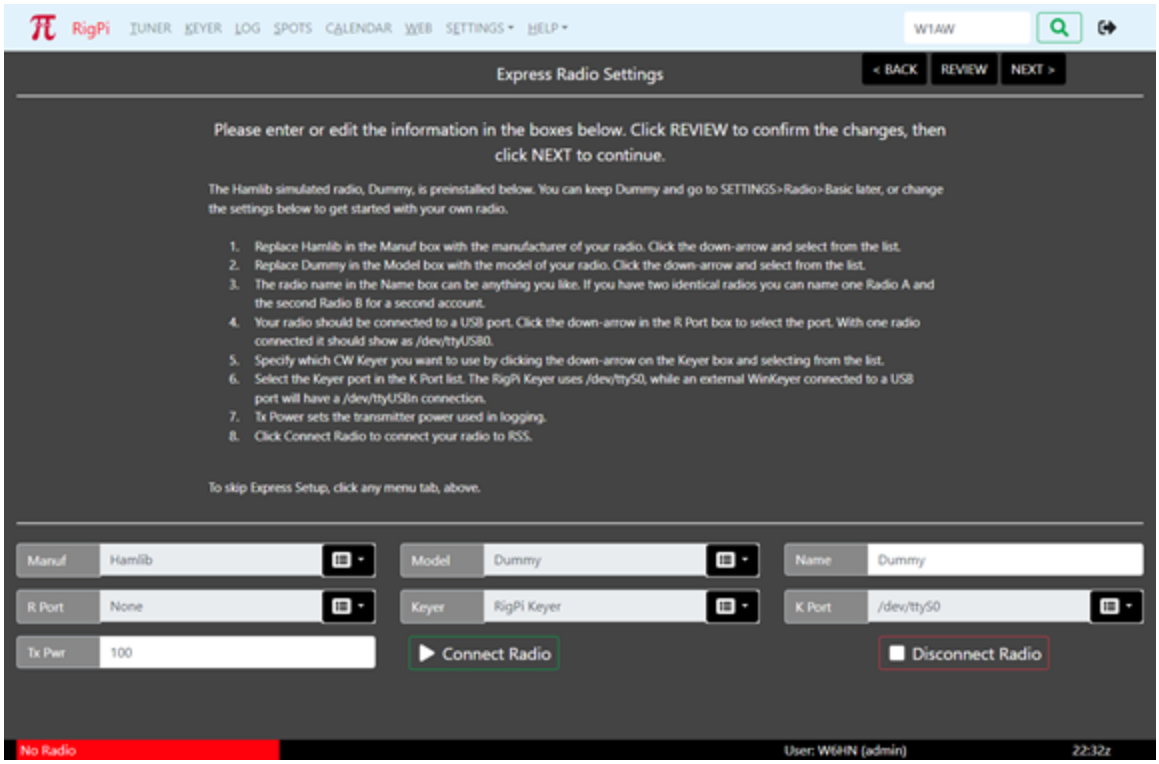


1. RSS is shipped with Username 'admin' and no (blank) Password.
2. Enter admin in the Username box.
3. Press Enter (leaving the Password field blank).
4. The RigPi Express User Settings window appears

RSS Express Settings have two windows designed to get you going rapidly. Express User Settings has fields for your Call, location, and optional QRZ XML subscription credentials. You must enter your call before proceeding.



Click Fill Below from Callbook to enter your name, state and grid square. If you haven't specified QRZ credentials, RigPi uses the onboard FCC database to fill in the information. This only works for US calls.



Express Radio Settings is originally configured with the Hamlib simulated radio, Dummy. You can set up your own radio or continue to use Dummy by skipping the Express Radio Settings.

Note: RigPi uses the default Baud rate for your radio in the Express Radio Settings window. If you have changed the radio's Baud rate you must use that Baud rate in RigPi. Skip the Express Radio Settings window and enter the Baud rate in SETTINGS->Advanced Radio.

Back Up Your Memory Card

Memory cards have a limited lifetime, so it is good practice to back up your card as insurance. For details on how to make a backup copy please refer to the System topic 232 in the Troubleshooting section of Help.

Shutting Down

Never disconnect the RigPi Station Server power supply without shutting down the RigPi Raspberry Pi first. Disrupting the power before shutting down can corrupt the microSD memory card.

1. Go to SETTINGS>System.
2. Click the Shutdown button.

3. Wait for the green activity light on the Raspberry Pi to stop blinking.
4. Disconnect the power.

Enjoy RigPi! Additional Help is available

- RSS Toolbar Help
- Online forum: RigPi Forum
- RigPi online help: Online Help
- PDF Help file: Help PDF

1.3 What's New

This topic will contain information about new features as they are added, bug fixes and other improvements.

4.0 changes 8/1/2025

- Shortcut keys 74 added for easier navigation from keyboard
- Shortcut keys for list control 94 added to Spot List.
- Access level 10 36 for PTT-only control of radio
- RigPi Lite 78 mode for low-cpu utilization (remote ops)
- Calendar/scheduler 94 for club radio use planning and event display
- <ip>:<port> can be used to link 2 RigPi's 60 (CW keying, radios and rotors)
- Reworked and improved CW element mode keying 220
- Support for CWMorse 221 USB-to-keying adapter
- Connect to the Keyer 214 from a second RigPi
- Support for K1EL RigPi Keyer (fan control and keyer selection for SO2R)
- Auto Power On 111 and/or Auto Power Off (selectable)
- Latest release versions of Hamlib, WSJT-X, Fldigi
- Latest Mumble version (1.6)
- Macros to mute 140 rig audio on one radio when 2 rigs are being used
- Macro to switch audio input on Icom radios from Mic to USB
- New ROTATE macro 141 that allows setting to a specific bearing (examples in Macro Bank 4)
- Show present rotor bearing on ROTATE macro buttons
- Macros to select 137 the Winkeyer pot or RigPi for CW speed control

- Option 126 in Keyer Settings to use Winkeyer speed pot or RigPi for CW speed control
- Improved PTT delay 114 function to prevent transmit noise burst
- Additional Flic 168 commands
- Support for TourBox 77 controller.
- Easy Mumble audio connections to 2 radios
- Log fields lengthened to allow for longer data
- Bullseye Raspberry Pi 32-bit Operating System (requires a Raspberry Pi 4 or 3, will not run on a Raspberry Pi 5)
- RigPi 4 License changed to MIT
- HTTP server moved from Apache to Nginx (Nginx is faster)
- ADIF Program ID added
- UFW 186 (Firewall) added
- ZeroTier 191 client added for remote connections without port forwarding
- Band and Mode buttons 69 show current settings by highlighting
- Set passband in TUNE TO dialog 148 (example in Macro Bank 1)
- Sub VFO assumes Main mode when entering split or changing modes while in split
- Status bar shows current passband
- VFO Buttons are disabled 72 except when in split mode
- Cooling Fan 165 support
- Grig 173, a lightweight radio control program added to Ham Radio menu.
- User Interface improvements and bug fixes
- Updated RigPi Hub 2.4.1 included with this release
- Help updates

3.0 changes 11/1/2021 (MFJ-1234C)

- Latest Mumble 179 client, 1.4 Release Candidate
- New bands added: 1.25m, 70cm, 23cm
- New Modes added: RTTY, RTTY-R, PKTUSB (USB-D)
- Remote character-based CW 214 (in addition to currently supported element-based, requires RigPi Hub 2.0.1 for Windows)
- iOS shortcuts 168 to control RigPi
- "Tune To" macro 134 for setting frequency, mode and passband
- Set max level for sliders 133 or disable them
- Assign macros to F-keys 134 (F1-F12)
- Latching macros 134 for toggling commands
- Assign colors 134 to latching macros
- Disable/enable band buttons 131 in Tuner window
- Continent setting in User Editor now a drop-down
- WSJT-X logged QSO's now properly transfer to RigPi (fix)
- Bank buttons on Tuner window separated, lock button moved
- Macro, Open web page 134 (such as QRZ.com) to current DX call

- Macro, Open web page 134 (such as DXSummit.fi) to current DX call or current band/mode
- Macro, set CW speed 134
- Last used macro bank is shown in Tuner and Keyer windows.
- Additional Flic commands 168: send CW message; send arbitrary radio command; tune to band; start radio
- Latest amateur radio program updates
- Web view uses map resource 99 that doesn't require intermediate server
- RigPi Hub updated to support element CW keying
- Added BleachBit as System Utility for cleaning disk
- Select PTT Toggle or PTT Momentary 111

2.0 changes 10/1/2020 (MFJ-1234B)

- Raspbian Buster operating system, compatible with Raspberry Pi 4 Model B and earlier.
- New settings for hardware, CAT and custom PTT control.
- Tap PTT or space bar to transmit, tap again to receive.
- Auto repeat for Tuning Knob +/- buttons.
- Lock Tuning Knob button.
- "Connect Radio" on Tuner turns on radio (supported radios only).
- Now use long ID name 111 for devices, better than USB ID for ambiguous connections.
- Remote CW Keyer 214.
- Delete text using backspace key when in CW HOLD mode.
- Settable PTT delay to remove noise at the beginning of a transmission.
- Macro stacking 134 (more than one macro in each definition) fixed.
- Save/Restore Macros 134, Macro sharing.
- Over 27 new radios and numerous fixes added with updated Hamlib 4.0.
- Security improvements, including addition of Fail2ban.
- Auto update Raspbian files.
- Auto expand image to fill SD card.
- Bug fixes when adding more than 3-4 users, rotor control and METER setting for transmit meter.
- Hardware PTT for WSJT-X when radio requires it to switch audio paths.
- New PTT On and PTT Off macros for controlling a power switch.
- Access level 4 added that prevents transmitting (PTT and Keyer).
- Support for Flic 168 remote switch (PTT, Power On/Off, Relay control)
- Slave port, using Kenwood CAT commands, for controlling SteppIR antennas, compatible power amplifiers and Kenwood radios.
- Control the Ameritron RCS-12 111 Automatic Antenna Switch or other antenna switches (requires special cable).
- Control 8 on/off devices with macros (requires special cable).
- Control 8 on/off relays 185 with macros or LED graphics.
- Detailed radio, rotor and RigPi access logging.

- 128 Macros, 4 banks of 32.
- New easy-access Macro button layout.
- RigPi Video 175 to watch your radio when operating remotely.
- Support for Contour ShuttleXpress 161 multimedia controller to control RigPi frequency and PTT.
- Improved operation with CommCat Mobile 160 for iOS including direct radio macros.
- Sliders for AF, RF, Power and Mic levels in Tuner and Keyer windows (only for radios that support changing these levels by CAT).*
- Slider for setting CW speed in Keyer window.
- Additional meter readings for transmit.
- Updated Help.

*If you find your radio is not responding correctly to sliders, analog level reading for that radio may not be fully implemented. In addition, some radios only support several fixed levels for a slider rather than a continuous range. Please post a note on the RigPi Forum to let us know of any problems you encounter.

1.05 Bug fixes 6/21/2019

- Power On for Elecraft KX3 operates only when that radio is selected for the current account.
- Adds information 206 in Help for a new overlay for RigPi Audio to fix several issues.
- Improved security in several modules.
- Addition of Security Topic 30 to Help

1.04 Bug fixes 6/12/2019

- Split for Icom radios when Split Polling is disabled is now working.
- KEYPAD double entry using smaller iPhones fixed.
- Improvements in TCP connections for RigPi Hub.

1.03 Bug fixes 5/29/2019

- Fixed Power On/Off for some radios that support it.
- Password issues fixed.
- Icom CI-V instructions in Help fixed.

1.02 Bug fixes 5/13/2019

- Disconnect radio from Tuner to permit manual entry of frequencies and mode for new contacts in Log Editor.

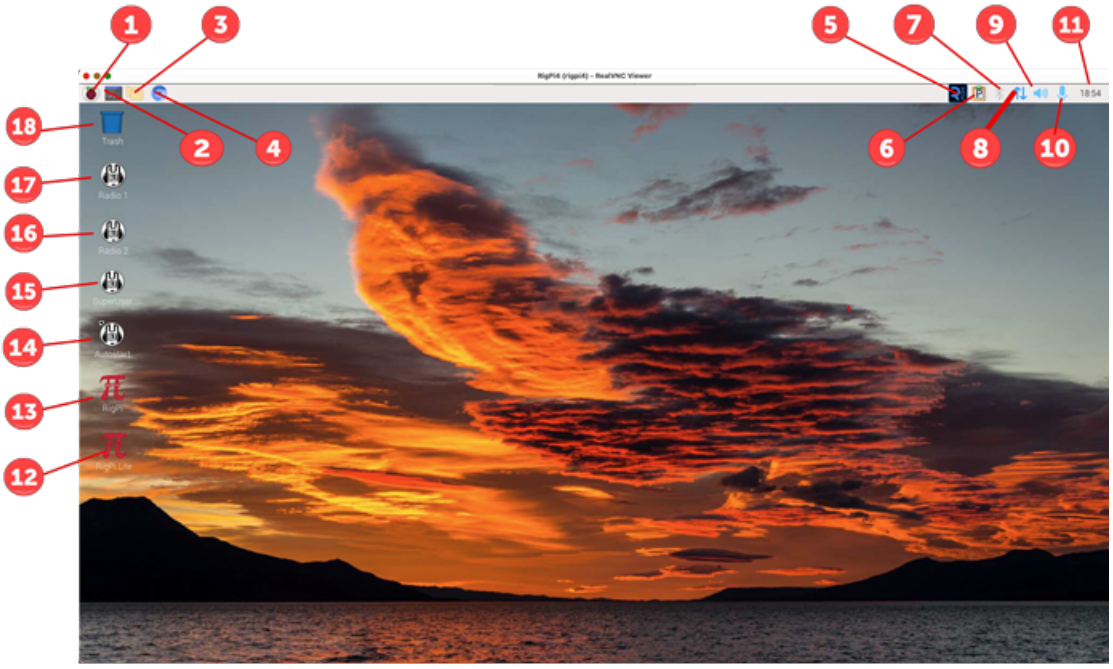
1.01 Bug fixes 5/11/2019

- Log Editor for new contact, TX and RX frequencies are equal when in simplex mode.

- Express User Settings, change to Username doesn't require a new login.
- Help updates

1.0 Initial release (MFJ-1234)

1.4 Raspberry Pi Desktop



The Raspberry Pi Desktop is similar to many graphics desktops. The Raspberry Menu button on the left end of the Task Bar is similar to a Windows File menu. Most buttons and icons have a right-mouse menu for additional options. You can access the Desktop by connecting an HDMI monitor to RSS, or by using VNC Viewer to access it from another computer.

The position of the Task Bar can be set to top, bottom, or a. To change the position (shown at the top, above), right-click over the Task Bar and select Panel Settings. In the Panel Preferences window, select the Edge Position you prefer.

	Function	Description
1	Raspberry	Applications Menu
2	Terminal	Shell access to RSS

	Function	Description
3	File Explorer	Navigate file system
4	Chromium Browser	Surf
5	VNC	VNC Server, use VNC Client at remote end to interact with desktop
6	Clipboard	Raspberry Pi Cut/Paste Clipboard
7	Bluetooth	Bluetooth Status
8	Wi-Fi/Ethernet	Internet Connection
9	Speaker	Audio status and output selections
10	Microphone	Audio In status and input selections
11	Clock	Digital clock showing local time
12	RigPi Lite	Start RigPi Lite
13	RigPi	Start RigPi in Chromium browser. It is best to connect to RigPi using an external browser, not the Raspberry Pi browser. By using an external browser the limited resources of the Raspberry Pi can be helped by sharing the load with another computer.
14	Mumble Superuser	Open Mumble as Superuser to make Mumble changes. No audio.
15	Mumble	Radio 2 Client
16	Mumble	Radio 1 Client
17	Trash	Deleted files

Setting up the Raspberry Pi

When you first start RSS you must make changes to the Raspberry Pi to adjust to your needs and location. These settings are done through the Applications Menu (1) >Preferences>Raspberry Pi Configuration menu item.

The Configuration window has four tabs at the top: System, Interfaces, Performance, and Localisation (sic).

In the Display tab, click the Headless Resolution drop-down list. Select the resolution appropriate for your monitor. Note this affects the screen resolution when the Desktop is viewed through the VNC interface.

In Localisation settings change: Locale, Timezone, Keyboard and Wi-Fi Country.

Change the font/icon size relative to the screen using the Appearance Settings in the Preferences menu. Defaults are provided for large, medium and small screens.

Finally, if you want to enable Wi-Fi, click the up/down arrow button (7) on the right side of the Desktop menu bar. Left-click, then click Turn On Wi-Fi and follow the instructions.

1.5 Universal Functions

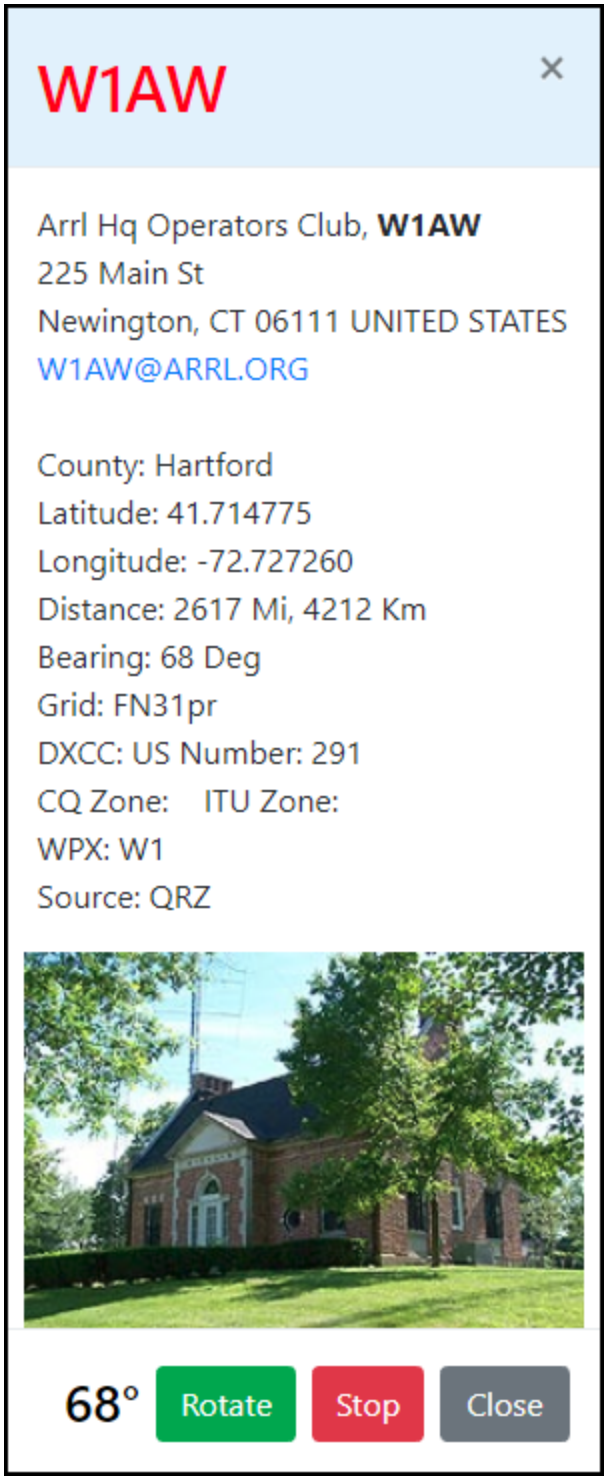
Each RigPi window has functions that are present on all RigPi windows.

Function	Where is it	Description
RigPi Logo	Red "Pi" logo at left end of the RigPi Menu bar	Click to open the RigPi web site: https://rigpi.net
RigPi Menu Bar	Top of RigPi window	A menu bar is provided to open RigPi windows. Several menu items have drop-down lists showing additional options. The Access Level you set in the User Editor window determines which menu items may be hidden. The SETTINGS menu is shown in full for ADMIN users, access level 1. Hide the SETTINGS menu by using a higher access level. The Users and System options are not shown for access level 2. The SETTINGS menu is not shown

Function	Where is it	Description
		at all for access level 3. The Keyer is not shown for access level 4. Use level 10 for PTT-only.
Callsign Lookup	Right end of RigPi Menu bar	Look up callsigns using the RigPi FCC Database, or the optional QRZ XML subscription database. Type a call and press Enter on your keyboard or click the magnifying glass button, to look up a call. The focus call is carried from window-to-window, and restored the next time you start RigPi. (QRZ XML access requires an Internet connection and a paid subscription.)
Log Out	Right end of RigPi Menu bar	Log out from the current RigPi account.
Radio Status Bar	Bottom of RigPi window	The radio status bar at the bottom of each RigPi window shows Main frequency, Sub frequency (if Split is turned on), mode, passband, the current user and user name, and the current UTC time.

Callsign Lookup

The Callsign Lookup panel shows detailed information for the entered call. The information comes from the onboard FCC database, or if enabled with a username and QRZ password, from the QRZ XML subscription service. At the bottom of the panel you can control your rotor by clicking Rotate or Stop. Set up you rotor in SETTINGS>Rotor. Note RSS comes with the Hamlib Dummy rotor installed for you.



Note: The distances and bearings are relative to your location. If you have not entered your location accurately in SETTINGS>Accounts->User Editor, the bearings and distances will not be correct.

1.6 RSS on Mobile Devices

RigPi can be used on any mobile device that provides an Internet browser. Since RigPi uses a browser, no app is required (other than Mumble for audio). Here are several samples of how the Tuner window appears on mobile devices.

iPad Pro

Single connection to one radio, landscape mode

iPhone

One connection to RigPi, one radio, Tuner, portrait mode

One connection to RigPi, one radio, Tuner, landscape mode

1.7 Security

One of the primary uses for RigPi is to allow you to control your station when you are away from home. Remote control requires that you open paths through your router to allow incoming data to establish a connection with RigPi. Without further safeguards RigPi's password/account system is open to malicious attack that could render your RigPi useless.

While RigPi is technically capable to operate remotely across public networks like the Internet, it's design and development to date has been focused on use within trusted private networks (home and/or VPN.)

RigPi was tested with the Joval vulnerability scanner and no vulnerabilities were found.

https://jovalcm.com/topics/open-source-oval-scanner/

OpenVPN

A technology called OpenVPN is one way to increase protection since it uses an encrypted key at both ends of a connection to prevent others who don't have the key from invading your system.

Two links to sites that show simple ways to install OpenVPN on the RigPi server are listed below:

http://www.pivpn.io/

https://www.youtube.com/watch?v=04EmeXSZo_0

The two approaches are similar, use either one.

Fail2ban

Fail2ban is installed on RigPi to help prevent intrusions. Fail2ban attempts to alleviate attacks by providing an automated way of not only identifying possible break-in attempts, but acting upon them quickly and easily in a user-definable manner. Please Google Fail2ban for more details.

The maximum number of failed attempts and the length of time an associated IP is blocked can be set in Fail2ban. RigPi allows three failed attempts after which the IP is blocked for one hour. When one hour has lapsed the block is removed. Fail2ban protects five services in RigPi:

RigPi Web access
Mumble
PhpMyadmin
Web bots
SSH access

Real VNC provides its own intrusion protection so it is not necessary to use Fali2ban for this purpose.

UFW

The UFW firewall is included with RigPi as an added security measure. It can be enabled or disabled. See the UFW topic 186 in Other Programs for further details.

UFW stands for Uncomplicated Firewall. It is a user-friendly command-line tool used to manage firewall rules on Linux systems. UFW provides a simple interface for configuring and managing the net filter firewall, which is built into the Linux kernel. It is designed to make the process of setting up a firewall easier for users who may not be familiar with complex firewall concepts.

Raspberry Pi Updates

It is critical to keep Raspberry Pi files up-to-date for security reasons. When vulnerabilities are present your system can be hacked. RigPi 4 shows when updates are available on the Raspberry Pi desktop in the upper right corner. Click the update icon to start the process.

Remote RigPi Without Port Forwarding

RigPi normally requires ports to be opened on your router because that is the only way for remote browsers to connect to the RigPi server. RigPi uses a web server for radio control and a VoIP server for Mumble. By using a remote server you can forget about opening ports, port forwarding, and the security downsides to running a server on the Internet.

Real VNC (realvnc.com) provides the VNC software for the Raspberry Pi. A VNC server is installed that allows you to use VNC Viewer to access the Raspberry Pi desktop. Real VNC also provides a free way to use their server using a Home account limited to 3 computers. You must set up an account with Real VNC, but once that is done, you can connect the server on your Raspberry Pi and any viewers to their server. To establish the necessary connections simplified port forwarding with no knowledge of your Internet IP required.

In VNC Viewer you can connect to the Raspberry Pi desktop. From there you can run RigPi or any of the digital mode programs.

You can find full instructions for using VNC on the Real VNC web site.

The other server running on RigPi that requires port forwarding is the Mumble server for two-way audio. Murmur servers are also available on the Internet for little or no cost. Rather than connect to the server on RigPi, by using a remote server you will not need port forwarding.

One popular Mumble server service is Mumble.com. If you sign up for a 2-year account the cost is under $4 per month. There are many other servers available (over 55 in the US alone), just check the list in Mumble>Public Servers.

ZeroTier (https://zerotier.com) is a secure service that eliminates the need for port forwarding in your router. ZeroTier is installed on RigPi.

1.8 Passwords

Using custom passwords is critical to the security of your RSS if you intend to connect to and control your station through the Internet. There are a number of passwords used in RSS. Here is a list with the default values and the procedures for changing them.

Name	Username Default	Password Default
RigPi and RigPi Lite Login	admin	blank (none)

Name	Username Default	Password Default
VNC	pi	7388
Raspberry Pi Login	pi	7388
PhpMyAdmin	mysql-user	7388
VoIP Server password to join server	Use your own unique username for each connection/device	7388

Name	How to Change	Notes
RigPi and RigPi Lite Login	SETTINGS > Accounts > Edit	Once you enter a password you can change it but not set it back to blank. Usernames and passwords can be any combination of upper and lowercase characters but no spaces are allowed.
VNC	VNC > Options > Security	Uses the Raspberry Pi credentials. Use VNC Viewer on a remote computer to connect to the RSS Desktop.
Raspberry Pi Login	Raspberry Pi Desktop>Applications Menu>Preferences> Raspberry Pi Configuration > System > Change Password	The Username can't be changed in Raspberry Pi Configuration.
PhpMyAdmin	PhpMyAdmin> User accounts > Change Privileges > Change Password	PhpMyAdmin is used to access and edit RSS databases.
VoIP Server password to join server	From RSS Terminal: **`sudo nano /etc/mumble-`**	The Mumble server runs on the Raspberry Pi. You can also use

Name	How to Change	Notes
	`server.ini` then look for serverpassword	remote Mumble servers. Users logging into the server for the first time must be told this password.

1.9 Accounts

RigPi accommodates multiple user accounts. Each account **must** have a unique username and can control one radio. Accounts can have the same callsign as other accounts. Two accounts can control two radios. The maximum number of accounts/radios is limited by the computing resources of the Raspberry Pi. Tests have shown this limit to be 4 or 5 accounts/radios active at one time.

Each account is like a separate logging/control program. Accounts have the following independent functions:

?Log in and Out
?Allow multiple users to access that account
?Personal call sign
?Assigned security level to limit access
?Control a single radio
?Control a single rotor
?Programmable set of macros
?Frequency/mode band memories
?Key CW for the radio for that account
?Maintain a log
?Receive spots from a unique source
?Search call books and display results
?Provide PTT-only access

Log In and Out

The user name and password are entered in the Log In window to access an RSS account. (Usernames can be any combination of upper and lower case characters, but no space characters are allowed.) Click the Log Out button in the top right corner of any RSS window to log out. Once logged out you can then log back in to the same account or a different account using the username and password (if any) for that new account.

When you create an account a password is not required. This is useful if you will not be accessing RSS from outside your local network. Once you create a password for an account you can edit but not remove a password through the Account Settings window.

Access Level Assignment

Access levels are assigned for each account. If you change the Access Level, RigPi asks if you want to reboot. Rebooting is recommended.

Access Level	Access
1	The most permissive, level 1 (admin) accounts can create new and edit existing accounts and assign a security level, user name and password for all accounts. Account 1 is always an Admin account.
2	Account and System Settings menu items in SETTINGS are hidden
3	All settings are hidden
4	Transmission is not allowed. PTT is disabled and the Keyer window is not available.
10	Provides PTT-only access (intended for VHF/UHF FM radios)

Allow Multiple Users to Access that Account

By sharing the account username and password, multiple users can log in and use that account. This is useful if you want to access your account through multiple devices or have multiple RigPi windows open at the same time. All users signed in to an account control the same radio,

rotor, CW Keyer and call book database. (It is also possible to share a radio from different accounts.)

Personal Call Sign

Each account has an assigned call sign. The call sign is used in CW Keyer macros and Telnet Spot access. An account can have the same or different call sign from that used in other accounts.

Control a Single Radio per Account

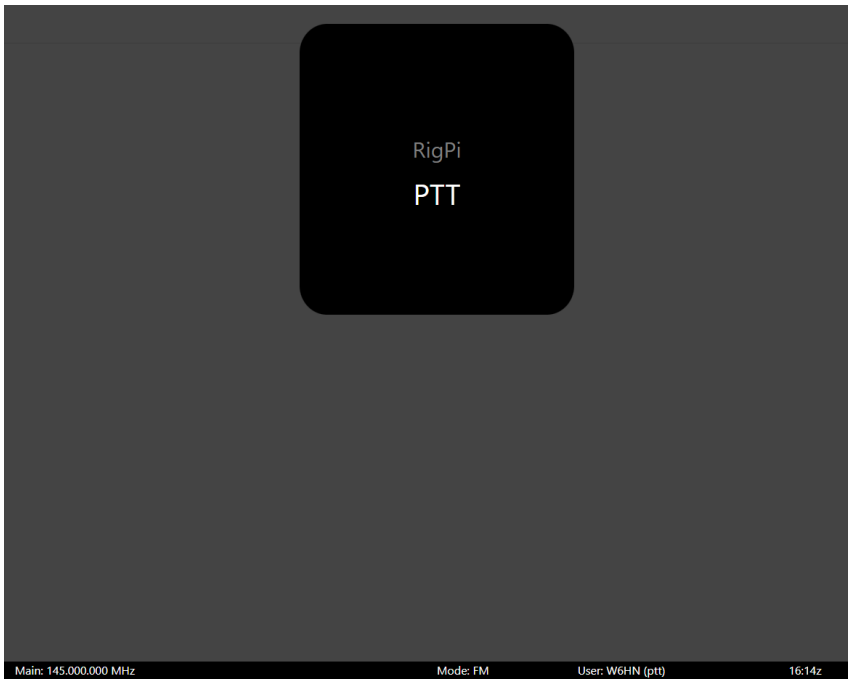
One radio can be controlled in each account. If you have more than one radio, set up an equal number of accounts, one for each radio. RSS uses the Hamlib library to provide a wide selection of manufacturers and radio models. A particular radio may not be fully supported by Hamlib even though it is listed. See the Technical Help Topic to learn more about determining what radio features are supported.

Each account and external programs can share an account's radio using a Hamlib radio called NET rigctl. See the Technical Help Topic for information on sharing radios.

PTT Access

There are situations where the only radio control required is PTT. This access level is handy for simplified operation such as controlling an FM radio for repeaters. All other controls and windows are hidden.

To set up the hidden controls, change the access level to 1 for that account. Set up the radio and PTT options using the Settings windows. Once the radio is working as you would like, change the access level to 10. Log out from RigPi. When you log back in, the menu will be hidden and only a PTT button shows. Some shortcut keys are available. Press ? on your keyboard to see a list.



1.10 Remote Operations: Legal Concerns

You can connect to RigPi from any location where the Internet is available. Remote operations are permitted in the United States, but not all countries allow it. Here is a summary:

US Stations

- FCC Rules: Part 97.109 Station control …"Any station may be remotely controlled."
- FCC Rules Part 97.213 Telecommand of an amateur station: …has some simple requirements, including a 3 minute time-out on the transmitter in the event of malfunction.

US Stations, with Operator outside of US

- Operator must have a US License, bilateral, reciprocal, IARP agreement or CEPT T/R 61-01.
- The call sign used must always indicate the location of the transmitter.

Stations outside of the US

- Countries have different regulations for whether remote is legal, and whether CEPT T/R 61-01 is accepted.
- In general, both the station and the operator must be licensed for that country.
- Confirm that the rules for your country allow for remote operations.

1.11 Acknowlegements

The RigPi 4 project would not have been possible without the help of many. The following are especially thanked for their help with testing, proof reading and feature suggestions.

- Mike, WB8CXO
- Dick, K6KXK
- Larry, K0LEJ
- Mark, K8MHW
- Glenn, VE9GJ
- Kevin, KB0VHA
- Rob, KI4MCW
- Steve, KE4LC
- Gary, KT7AZ
- Jim, KK5VG
- Loic, SM5VFE

And from MFJ Enterprises:

- Martin, K5FLU
- Ben, KB5ZO

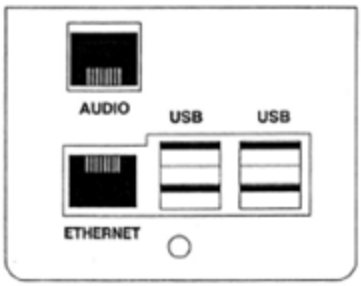
RSS Connections

2 RSS Connections

The Raspberry Pi provides a number of connections. Here is a list:

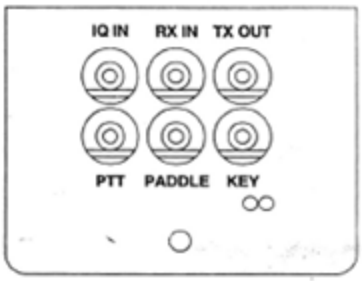
- USB 2.0 (4), or 2-USB 2.0/2-USB 3.0 for the Raspberry Pi 4.
- Gigabit Ethernet
- 802.11ac/n wireless LAN (2.4 and 5 GHz Wi-Fi)
- Bluetooth 4.2 Bluetooth Low Energy (BLE)
- HDMI (micro HDMI for Raspberry Pi 4B) video/audio
- 3.5 mm audio out
- Micro USB (USB-C for Raspberry Pi 4B) power

The RigPi Audio and RigPi Keyer have their own connections described in the following topics. The drawings below are for the original RigPi. The RigPi 2 Keyer by Steve, K1EL, and later have a modified design to accommodate connector positions.



AUDIO uses same jumper blocks and cables as MFJ-1204

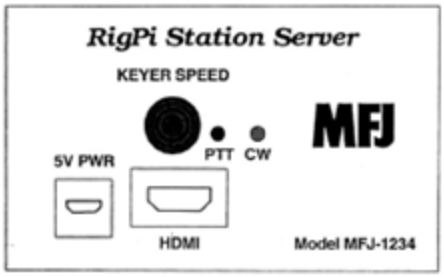
USB USB2 connections on Raspberry Pi3 board
ETHERNET Raspberry Pi 3 Ethernet connection on board.



3.5mm Jacks

IQ IN Tip left line, ring right line.
RX IN Tip left line or mic.
TX OUT Tip left channel out. Ring PTT from Pi3 GPIO.

PTT Tip PTT from Winkeyer chip, ring NC.
Paddle Tip dot, ring dash.
KEY Tip key, ring NC.



5V PWR 5V supply line.
HDMI HDMI video only. Audio disabled.

2.1 Radio Control

RigPi controls each radio through one of the four USB connectors on the Raspberry Pi. If your radio has a classic serial port, a serial-to-USB adapter is required. Older Icom radios provide CAT through a CI-V system. A CI-V to USB adapter is required. Most newer radios use a USB connection for CAT control so no adapter is needed.

If you are using ADMIN as your callsign (default when starting RigPi for the first time), use the Express Radio Settings window to configure the radio connection. Normally you will use SETTINGS>Radio>Basic or SETTINGS>Radio>Advanced. Advanced settings may be necessary if you have changed any of the default settings on your radio.

In Basic settings, select the Manufacturer, Model and Port from the drop-down menu lists. If the radio USB cable is the only one plugged in, the port will usually be /dev/ttyUSB0. You will also see the long name starting with /dev/serial/by-id... Select the long name, then click the Connect Radio button.

If the radio doesn't connect, please see the Radio>Advanced topic in the Settings section of this Help for troubleshooting support.

Power On/Off

Most radios can be powered on and off by means of CAT commands. Use the PWR ON/PWR OFF macros to turn your radio on and off. The power on cycle can take up to 40 seconds for some radios. RigPi can turn the radio on and/or off automatically by using the options in Advanced Settings->Pwr Ctrl.

Connecting to a Radio through a TCP port

It is possible to connect to a radio that supports TCP through an Internet connection rather than through a USB port. For example, your radio may accept an Ethernet connection for CAT control, or you may be using a serial-to-Ethernet or serial-to-Wi-Fi adapter.

For an Ethernet connection, enter the IP and port in the Port box in Radio Settings. If I had a radio connected to 192.168.1.80, port 30073, type the following in the Port box:

192.168.1.80:30073

You must type this information into the box, it does not appear in the drop-down list for Port options. When you save the Radio settings, the <IP>:<Port> value is saved.

2.2 Rotor Control

Important

RigPi uses your location and the location of a remote station to predict the correct bearing. You must enter your location's latitude and longitude in SETTINGS>Accounts>Account Editor for this to work.

RSS controls each rotor through one of the four USB connectors. If your rotor controller has a classic serial port, a serial-to-USB adapter is required.

Use SETTINGS>Rotor to configure your rotor.

In Rotor settings, select the Manufacturer, Model and Port from the drop-down menu lists. If the rotor USB cable is the only one plugged in, the port will usually be /dev/ttyUSB0 plus a long name for the same port. Save the new settings and restart the Radio connection. The Rotor is initialized with the radio at the same time.

For rotors that connect via a USB cable, the long name for the connection may appear in the port drop down list. Select the long name to provide persistence after a reboot.

2.3 RigPi Audio

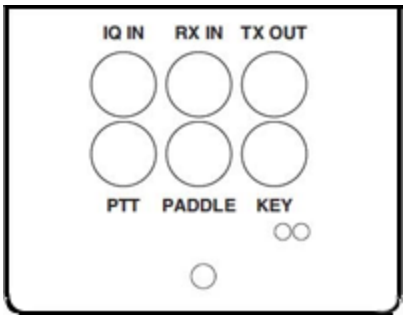
Audio to and from your radio is used for two-way audio (VoIP) for remote operation or for digital mode programs. Audio can be routed through the RigPi Audio board, an external USB audio soundcard, or through audio CODECs in many newer radios.

The default audio device for RigPi is selected from the device list shown by right-clicking the speaker icon on the Raspberry PI desktop. The RigPi Audio board uses the device named snd_rpi_proto, while most radio CODECs are designated as USB Audio CODEC. Choose the one you want to use.

The instructions below assume you will be using the RigPi Audio board and not an external CODEC. Instructions for using CODECs are provided later in this manual.

RigPi Audio can be used with VoIP or digital mode and spectrum analyzer programs. RigPi Audio is connected to RSS through the Raspberry Pi GPIO header, it does not connect via USB. Right-click the Speaker icon on the top right end of the RSS Desktop menu bar to confirm that the RigPi Audio driver, snd_rpi_proto, is listed and selected. See the Alsamixer Help Topic if you need to troubleshoot.

If you are using an early RigPi and see an entry for audioinjector-pi-soundcard you will need to follow a simple procedure to manually update RigPi. The instructions for making the change are in the RigPi Audio Update topic, Technical section, of this Help..



RX IN

Connect the audio out from your radio to the RX IN 3.5mm jack. The tip and sleeve connections are isolated through a transformer to reduce hum.

RX IN can be set up to provide a line or microphone input. The default is line input with a maximum of 2-volts peak-to-peak. To accommodate lower level audio sources, the RX IN

input can be switched to a microphone level input. This is done using a program called Alsamixer. See the Alsamixer topic in Other Programs to learn how to use Alsamixer.

TX OUT

Connect TX OUT to your radio audio input. The tip and sleeve connections are isolated through a transformer to reduce hum. The TX OUT ring connection has several purposes. Normally it is used to control the PTT connection on your transmitter.

The easiest way to connect audio to a radio is through a rsadio's rear-panel accessory (Data) input jack. Most radios that provide this connection also require PTT at that jack to switch audio input from the front-panel microphone jack to the accessory jack. The PTT connection on the ring of the TX OUT connector can be used for this purpose.

I/Q IN

The I/Q input connection provides a way to connect the IQ signal from many radios such as SDR and the Elecraft KX3 to perform spectral analysis. Similar to "Panadapters" that were used years ago, an I/Q display shows a graph of signal level vs frequency over a wide bandwidth. The bandwidth in RSS is limited to 96 kHz as determined by the sampling rate of the audio chip used on the RigPi Audio board.

The I/Q input uses the left and right stereo inputs to the audio chip. The signals are not transformer isolated. Use Alsamixer to make sure RigPi Audio is in the Line Input mode.

RigPi Audio with Mumble VoIP

Mumble provides 2-way audio between your radio and a remote device, such as an iPhone or Android mobile phone. A Mumble server (named Murmur) is installed on RSS and always runs in the background. Mumble clients connect to Murmur for passing audio. One Mumble client is installed on RSS and is normally started on the Raspberry Pi desktop when RSS boots. Mumble clients on other devices connect to the same Murmur server where input and output audio is heard by all connected clients.

The Mumble client in RSS connects to your radio. Receive audio is fed to the Mumble client input and Mumble client output is fed to the radio mic input. The radio audio is provided to and from Mumble through the RigPi Audio board or a CODEC built in to the radio. If your radio has a built in CODEC for audio, the RigPi Audio board is not used. In this case, audio to and from the radio is carried over the USB CAT control cable.

Setting up the MFJ RigPi Audio Board for VoIP

RigPi Audio can accept audio through a microphone or line input source. If your radio has high output level (no more than 2-volts peak-to-peak) you should use the line input. If your radio audio output is low (no more than 200-mV peak-to-peak), use the microphone input. RSS initially uses the microphone audio input. If you want to use line input, the input selection is made through a program called Alsamixer.

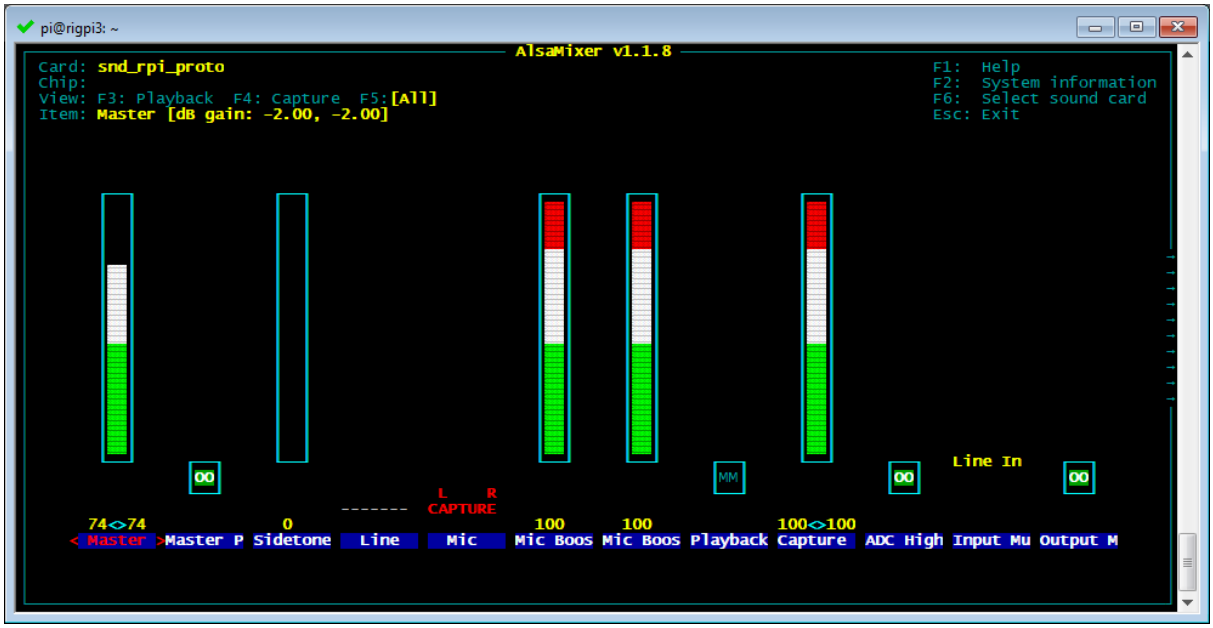
Use the RX IN connector for audio from the radio and TX OUT for audio to the radio. The cable connects to the RJ-45 connector on the USB/Ethernet end of the RSS cabinet. The left channel is used for input and output audio. These connections are transformer-isolated. If you are using an RJ-45 cable, you must also use a jumper header in RigPi to complete the connections. MFJ cables come with a prewired header for the radio you have specified. A jumper header is installed on the RJ-45 daughter board, as shown below.

RigPi Audio does not have any onboard adjustments. RigPi Audio levels can be set through a program called Alsamixer or from the desktop icons for speaker and microphone.

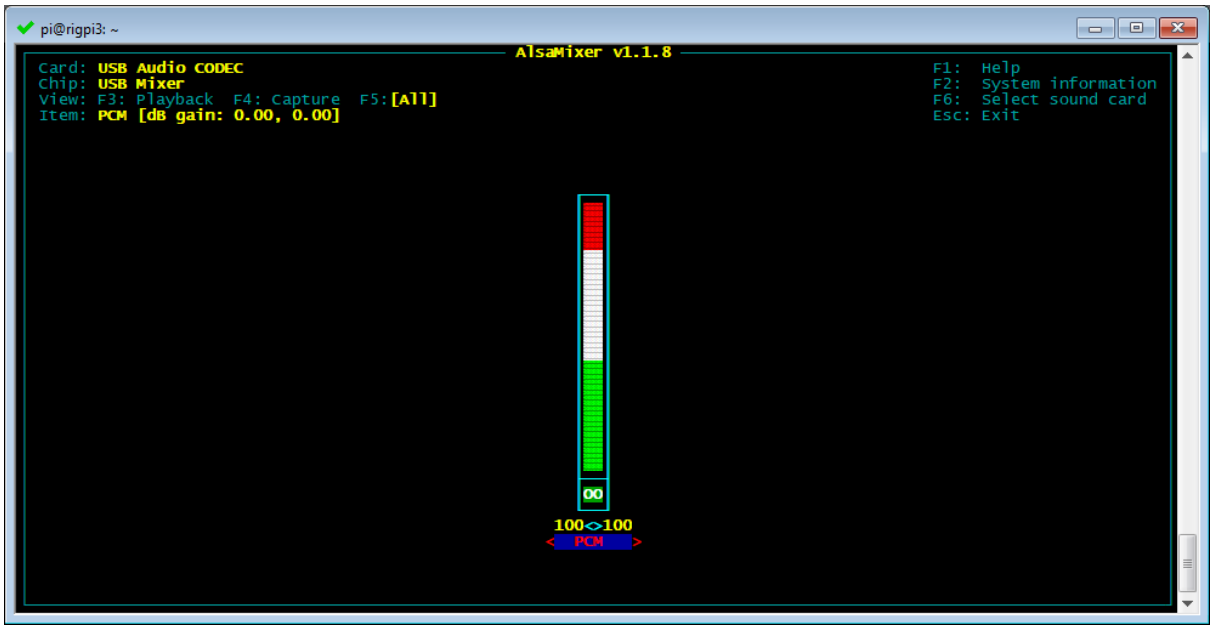
Start Alsamixer from the Terminal window on RSS Desktop. Open Terminal and type:

alsamixer<return>

Here is the alsamixer view for the RigPi Audio board:



...and for a CODEC:



Note the following Alsamixer controls:

Use left/right arrow keys to move between settings

Playback options (F3)

1. Card: snd_rpi_proto (RigPi Audio), use F6 to select

2. Master gain set high, use up and down arrow keys to adjust
3. Mic Boost set high, use up and down arrow keys to adjust
4. ADC High Pass On, use M key to toggle
5. Input Mux Mic, use up/down arrow keys to adjust
6. Output Mixer On (OO, use M key to toggle

Capture options (F4)

1. Line [Off, Off], use Space bar to toggle
2. Mic On, use Space bar to toggle
3. Mic Boost (high), up/down arrow keys adjust
4. Capture (high), up/down arrow keys adjust

Setting up CODEC audio for VoIP

Please see the Mumble topic 179 for details on using radio CODECs for audio.

Mumble Clients

On Windows, Macintosh and iOS, use the client named Mumble. One client for Android devices is named Plumble. They all operate in the same way. Start Mumble (or Plumble) and open the Favorite Servers settings. Click the + button to add a new Favorite.

Complete the Description, Address, Port, Username and Password settings. The Address holds the IP for the Murmur server, the Port defaults to 64738, Username can be your call, and password 7388 (unless you have changed it). The Username MUST be unique. If you have a tablet and phone, both running Mumble, one can use <your call> as Username and the other must use something like <your call>-1. You can also use phone as a username and tablet as the second username.

Radio Quirks

Most radios provide audio connections that are straightforward. Some radios, notably Kenwood models, provide audio connections through a Data connection on the rear panel. You will find many more details on the RigPi forum. Use the Search function to look for information in Topics. There are also a number of documents in the Files section that deal with specific radio connections and setups.

Kenwood radios with a Data connector

Since the radio normally expects audio to come through the microphone connector, a switch signal must be provided to the Data connector. The switch signal is normally PTT.

This means that you must make three connections if you are using the rear panel Data connector: audio in, audio out, and PTT.

Yaesu (HF models)

Some Yaesu radios only pass audio when in digital/PSK mode, such as the last generation of HF radios (FT-817(ND), FT-818ND, FT-857(D), FT-897(D)). For full functionality, a microphone interface is needed.

Audio routing determined by menu settings

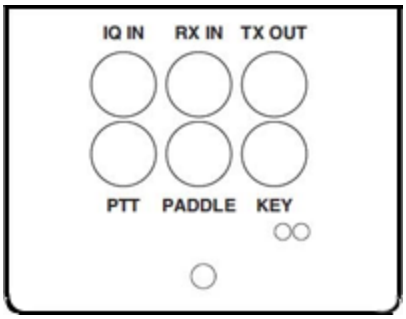
It may be necessary to change menu settings in your radio to provide an audio path through a rear panel connector. Some radios, such as the Yaesu FT-950, only allow transmit audio to pass through the Data connector using the PSK mode.

Mumble Settings

See the Mumble topic in Other Programs for the necessary settings.

2.4 RigPi Keyer

RigPi Keyer is a versatile Morse code generator based on the popular K1EL WinKeyer3 IC. It connects to the Raspberry Pi through the GPIO header and uses the onboard serial port, ttyS0. The image below shows the MFJ RigPi connector configuration. See also the K1EL RigPi Keyer 50 topic.



Keyer Connections

Connection	Use	Note
PTT	Pull-down when in transmit	Can be reconfigured as a general

		purpose switch.
PADDLE	Connect a paddle to control the keyer using tip, ring and ground	You can also use a straight key connected between tip and ground.
KEY	Connect to you transmitter keying input.	

RigPi Keyer can be used with a paddle or straight key plugged into the PADDLE jack with or without a radio connected. The KEYER SPEED control works when the keyer is not under RigPi control and when using any of the main RigPi windows.

RigPi Keyer has a PTT switching circuit that normally follows PTT commands from RigPi. You can also use the WinKeyer3 PTT circuit independently through commands. Independent control means that you can use the RigPi Keyer PTT for remote control purposes, such as controlling a power switch. See the Technical RigPi Keyer PTT topic of Help to learn more about extended uses of RigPi Keyer PTT.

Settings

The RigPi Keyer settings are located in SETTINGS>Keyer. Morse can be sent by typing on a keyboard, through a custom Macro, or by means of a keying paddle. It is possible to use a straight key as well as a paddle.

If you are using an external Winkeyer, when RigPi boots the keyer is in the command mode the memory buttons play back any recorded messages. After starting RigPi (and thus initializing the Winkeyer) the Winkeyer is in the Host mode and the memory buttons do not operate.

The WinKeyer3 IC has an extensive set of programming commands, many of which are used in RigPi. You can also create Macros using these commands for special purposes.

Remote Keying

When away from home you can use your favorite hand key to send CW via your home station. A second RigPi, external Winkeyer/Raspberry Pi, or RigPi Hub with a Windows program that

can key RTS or DTR is required. RigPi does not have to have an Audio board. You can use a paddle, bug, or straight key. Please see the RigPi Remote Keyer topic 214 for details.

2.5 K1EL RigPi Keyer and Box

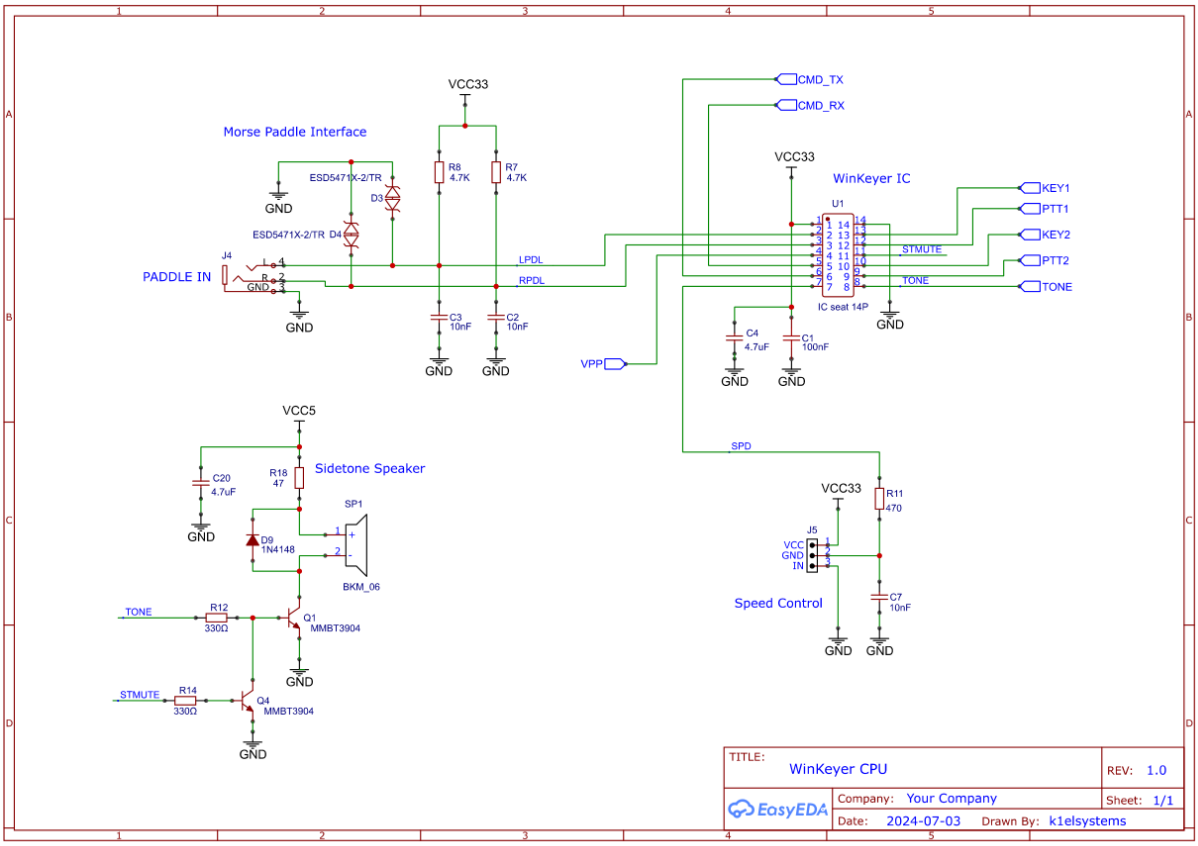
The K1EL RigPi Keyer is software-compatible with the MFJ Keyer board, but is physically different. The K1EL RigPi Keyer board supports a fan for cooling. The enclosure has cutouts for the fan. It also supports SO2R (single-operator, two-radio) keying which is controlled by RigPi.

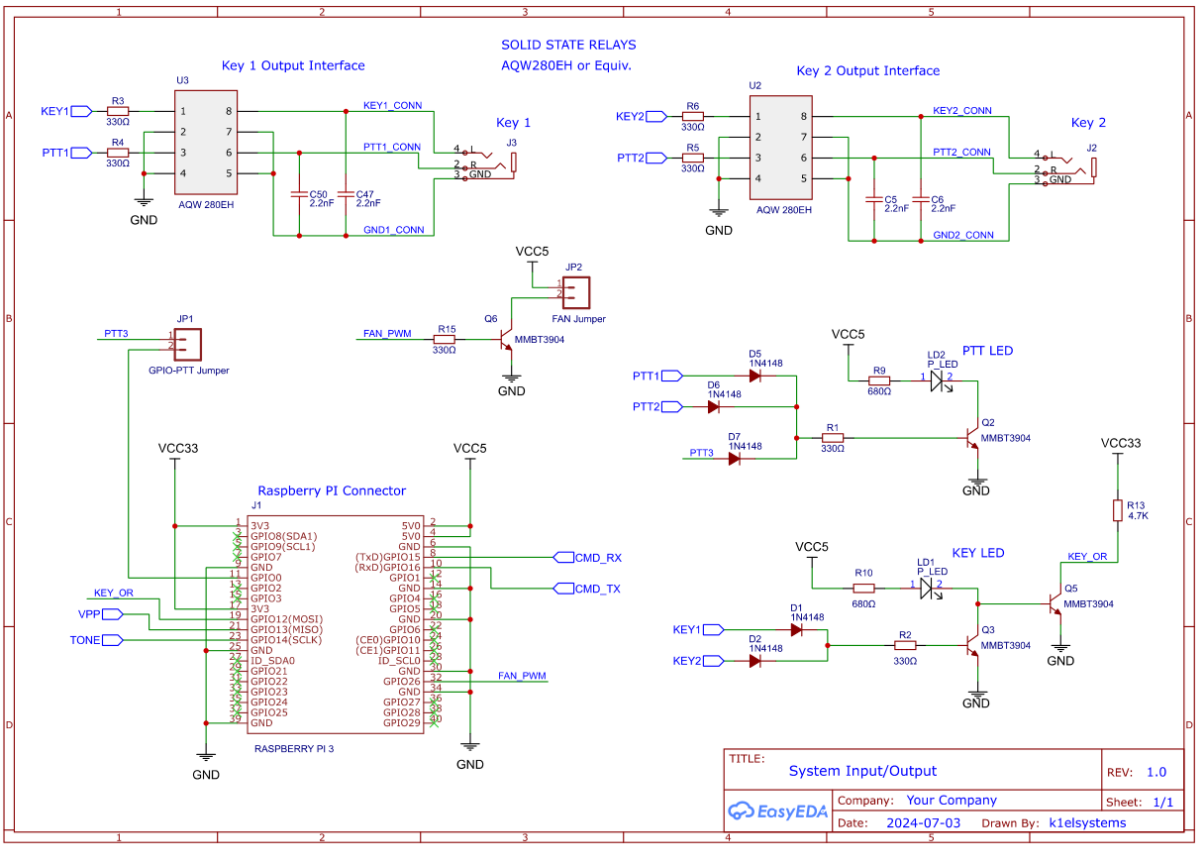
Steve has created a new RigPi enclosure which you can 3-D print. Many local libraries provide this service. The K1EL RigPi Keyer schematics and files for printing can be found at the K1EL web site:

k1elsystems.com

The K1EL enclosure does not support the MFJ audio board. You can use CODECs in your radio (if available) or an external USB dongle for audio.

The schematics for the K1EL RigPi Keyer board are included below:





2.6 Internet Connections

RSS is designed to operate without Internet access. This feature makes it convenient when taking RSS away from your home for portable or mobile operation. Several non-critical features that do rely on Internet access are listed below:

1. QRZ XML Call look up service (Callbook)
2. World map (Web)
3. Update FCC Database (System settings)
4. Spots (Spots and Spots settings)
5. LoTW downloads and submissions
6. Time updating

Even if you do not have an Internet connection you can use RSS WI-Fi to connect to other computers. It is easy to set up an ad hoc network so other computers or mobile devices can communicate. Wi-Fi can also be used in lieu of an Ethernet cable to connect to a router.

Here is a link to several messages on Stack Exchange that give instructions for setting up Wi-Fi ad hoc networks on the Raspberry Pi and for making the Raspberry Pi IP static so it doesn't change when you reboot.

Click to see Static Instructions

2.7 Remote Connections

Internet Access to your Raspberry Pi

Port Forwarding

The following instructions apply to a Netgear R8500 Router. The steps for your router will be different.

Netgear routers do port forwarding by assigning port numbers to a "service" that is associated with the application you want to run.

To open the ports for RSS:

1. Type the router's address in an Internet browser's address bar. (By default the router's address is 192.168.0.1 or 192.168.1.1). The Setup Wizard appears
2. Enter the router's username and password
3. Under Advanced, click Advanced Setup, then Port Forwarding on the left menu bar (varies slightly by Router)
   A Port Forwarding Screen appears
4. Click Add Custom Service. The Custom Services window opens
5. Enter **RSS** for the service name
6. Select TCP in the Service Type drop-down
7. Enter 7488 in the External Starting Port box
8. Enter 7488 in the External Ending Port box
9. Remove the check for Use the same port range for Internal Port
10. Enter 80 in Internal Starting Port
11. Enter 80 in Internal Ending Port
12. Enter the LAN IP for RSS in the Internal IP address
13. Click Apply
14. To add **Port Forwarding for Mumble**, click Add Custom Service and follow the same steps
15. Use Mumble for the name. TCP/UDP for the type and 64638 in the External Port boxes
16. Enter 64738 in the Internal Port boxes
17. Enter the LAN IP for RSS in the Internal IP address
18. Click Apply
19. To add **remote VNC viewer** access to open RSS Desktop, click Add Custom Service and follow the same steps
20. Use VNC for the name. TCP for the type and 5900 in the External Port boxes

21. Enter 5900 in the Internal Port boxes
22. Enter the LAN IP for RSS in the Internal IP address
23. Click apply
24. To add access to the **RigPi Video Camera**, click Add Custom Service and follow the same steps
25. Use VideoCamera for the name. TCP for the type and 8081 in the External Port boxes
26. Enter 8081 in the Internal Port boxes
27. Enter the LAN IP for RSS in the Internal IP Address
28. Click Apply
29. Click Logout to exit from router settings

With RSS running, open canyouseeme.org with your browser and confirm that ports 5900, 7488, 8081 and 64638 are open.

To connect to RSS using a browser when away from home, enter the WAN IP (from SETTINGS>System) followed by a colon and 7488:

97.222.46.198:7488

The WAN IP above is fictitious, use your own. Now you can log in and control your radio from anywhere Internet access is available.

To connect Mumble on your remote client, open the Edit window for the rigpi server connection and change the port to 64638.

Important Port Forwarding Note

Some Internet Service Providers supply a Modem that contains a single-port router. If you use an external router with such a device, port forwarding will not work without extra settings. Here is an article on the web that explains the 2-router problem. If port forwarding doesn't appear to work for you, please read this a

Click to Go to PortForwarding.com

Note: Port Forward is an excellent resource for help if you run into trouble with port forwarding. They also sell programs to aid with the process. Most port forwarding issues can be solved without the need for other programs.

ZeroTier

ZeroTier is a software-defined networking (SDN) solution that allows you to create and manage virtual private networks (VPNs) easily. It enables devices across the internet to

communicate securely as if they were on the same local network. By using ZeroTier you do not need to set up Port Forwarding through your router. ZeroTier is installed on RigPPi.

Here's a more detailed overview of what ZeroTier is and its key features:

- Key Features of ZeroTier

1. Peer-to-Peer Networking: ZeroTier creates direct peer-to-peer connections between devices, reducing latency and improving performance compared to traditional VPN solutions that route all traffic through a central server.

2. Cross-Platform Support: ZeroTier runs on a wide range of operating systems, including Windows, macOS, Linux, iOS, Android, and various embedded systems like Raspberry Pi.

3. Ease of Use: Setting up a ZeroTier network is straightforward. You can create and join networks with just a few commands or clicks, and management is done through a web-based interface called ZeroTier Central.

4. Security: ZeroTier uses end-to-end encryption to secure all data transmitted between devices on the network. This ensures privacy and security, even over untrusted networks like the internet.

5. Flexibility: You can configure ZeroTier networks to behave like traditional LANs, with support for custom IP addressing, multicast, and broadcast traffic. This makes it suitable for a wide range of use cases, from simple remote access to complex network topologies.

6. Scalability: ZeroTier networks can scale from small personal networks to large enterprise deployments. The system is designed to handle a large number of nodes with minimal configuration effort.

7. Open Source: The core of ZeroTier is open source, which means you can review the code, contribute to its development, and even deploy your own ZeroTier controllers if desired.

- How ZeroTier Works

1. Network Creation: You create a network in the ZeroTier Central web interface. This network gets a unique network ID.

2. Joining a Network: Devices (nodes) join the network using the ZeroTier client software and the network ID. Once a node joins, it appears in the ZeroTier Central interface.

3. Authorization: Each new node must be authorized in the ZeroTier Central interface before it can fully participate in the network. This step ensures that only approved devices can connect.

4. Communication: Once authorized, nodes establish direct peer-to-peer connections with each other, and all traffic between them is encrypted.

5. Management: Network settings, such as IP address assignments, access rules, and routing policies, are managed through ZeroTier Central.

Setting up ZeroTier on a Raspberry Pi is a straightforward process that allows you to create a virtual network for secure, private connections over the internet. Here's a step-by-step guide to get you started:

- Prerequisites

1. A Raspberry Pi running a recent version (Bullseye) of Raspberry Pi OS
2. An internet connection
3. A ZeroTier account (you can create one for free on the ZeroTier website:

   https://www.zerotier.com/

- The ZeroTier client is already installed on RigPi 4

- Join a ZeroTier Network**
  Replace `<network_id>` with your actual ZeroTier network ID using Terminal:

  sudo zerotier-cli join <network_id>

- Authorize the Device
  Go to the ZeroTier Central (https://my.zerotier.com/) web console, log in with your ZeroTier account, and find your network. You should see your Raspberry Pi listed as a member with a unique ID. You need to authorize this device by checking the box next to its entry.

- Verify the Connection
  To check if your Raspberry Pi is connected to the ZeroTier network, run:

  sudo zerotier-cli listnetworks

  You should see your network listed with a status indicating it is `OK`.

- Additional Tips

Persistent Network Configuration: Ensure your ZeroTier service starts on boot by enabling the service:

sudo systemctl enable zerotier-one

- Firewall and Security: Ensure that your Raspberry Pi's firewall allows ZeroTier traffic. If using `ufw` (Uncomplicated Firewall), you can allow ZeroTier traffic with:

  sudo ufw allow 9993/udp

- Check ZeroTier Status: To check the status of ZeroTier service:

  sudo systemctl status zerotier-one

- Troubleshooting: If you encounter any issues, check the ZeroTier logs for clues:

  sudo journalctl -u zerotier-one

By following these steps, your Raspberry Pi should be successfully connected to your ZeroTier network, allowing you to securely access it from anywhere as if it were on a local network.

Remote RigPi Clients

RSS can be accessed from anywhere via the Internet. Access is made available through RSS and router settings. All user accounts should be password protected before you allow any access.

RigPi provides 4 ways for remote access.

1. Browser: Any browser (desktop, phone, tablet) can be used to access RigPi from a remote location. Audio is provided through a separate Mumble Clients running at the RSS station and remote locations.
2. RealVNC: This option provides access to the Raspberry Pi desktop. You can use the desktop browser to control your radio.
3. RigPi Hub on a Windows computer: The Hub connects to RigPi using port 30001. With RigPi Hub you can use your favorite logging program to control RigPi.
4. Link another RigPi: Use a second RigPi at the remote location to connect to your home RigPi.

All connection options require port forwarding unless you are using ZeroTier. Up to six ports must be opened: 1) browser; 2) audio VoIP; 3) VNC viewer 4) Video Camera (optional); 5) RigPi Hub/Linked RigPi port; 6) Remote CW. By using a service such as ZeroTier, it is not necessary to open any ports on your router. ZeroTier 191 is installed on RigPi but must be configured.

Service	Normal Port	Protocol
RSS Browser access	80	TCP
Mumble (VoIP)	64738	TCP/UDP
VNC	5900	TCP
Video Camera	8081	TCP
Remote CW	30040	UDP

Browsers, by default, connect to port 80 on a server. This access port must not be blocked by a router or firewall. Your router's advanced settings provides a way to forward connections from the outside to a specific LAN IP and port. Firewall configuration is avaialble through the operating system settings.

The LAN IP for RSS can be found on the System settings page (SETTINGS>System). It will be an address like 192.168.1.20. The RSS browser, Mumble, VNC and Video Camera ports must be able to transverse your router to get to these ports, otherwise they are blocked. This is called Port Forwarding.

Many routers provide a way to translate an incoming port to a different port. This translation provides a slightly higher level of security than simply forwarding port 80. Set the External Starting and Ending port to something like 7488. Set the Internal Starting and Ending ports to 80. Your router will now accept an incoming connection on port 7488 and forward it to port 80 on rigpi4.local. When away from home you would instruct your browser to connect to port 7488. If your router does not provide port translation, open port 80 instead and you will connect to the default browser port, 80.

The default Mumble port is 64738. This port must be forwarded through your router. You can use the same translation trick as with browser connections, but you must also tell the mumble client which port to use if not the default. Mumble data are encrypted.

VNC Viewer gives you access to the RSS Desktop from any device. VNC Viewer clients are available for most operating systems and devices. To use VNC Viewer from a remote location you must forward the port used by VNC. The default port for VNC viewer is 5900.

Password Protection

Since RSS is now open to the Internet, add passwords to all accounts before proceeding.

RigPi Remote Linked Connections

Use the Link capabilities of RigPi to connect a second RigPi or another program such as WSJT-X to your Home RigPi.

Rather than using a remote computer or device to connect to (Home) RigPi, you can use a second (Remote) RigPi. Set up Home to control your radio, rotor and keyer. Set up Remote using the Home IP and Port in the Remote->Advanced Radio->R Port and Remote->Keyer->Port boxes. Use the Hamlib Home->Advanced Settings->Manuf and Net rigctl in Model. For Rotor, use Hamlib for Home->Rotor->Manuf and Net rotctl Rotor in Remote.

if Remote is using the same LAN as Remote, the Home IP is found in Home->System Settings->LAN IP 1. If connecting from another location, use Home->System Settings->WAN IP. Use Home->System Settings->Rigctl Port for the Remote port. Use the same IP and Port + 1 in Rotor Settings.

If Remote is at another location, you must forward the port you are using at home. For example, if you are using Account 1, the radio control port is 4532. Port 4532 must be forwarded through your Home router. If you want to use audio, the Mumble port must be forwarded, as well as the VNC port if desired. It is not necessary to forward port 80 in your Home router if you are using a Remote RigPi using port 4532.

Same Network

Remote RigPi
My Living Room

—LAN—

Home RigPi
My Shack

Separate Networks

Remote RigPi
My Vacation Home

—Internet—

Home RigPi
My Shack

Connection	Home RigPi	Remote RigPi on same LAN network	Remote RigPi on separate network	Notes
Radio Control Port	USB to radio	<Home LAN ip>:80	<WAN ip>:80	Browsers can connect using port 80 or WAN <ip>* to any RigPi. Port 80 must be forwarded in your Home router when accessing RigPi from a remote location.

Connection	Home RigPi	Remote RigPi on same LAN network	Remote RigPi on separate network	Notes
Remote RigPi	USB to Radio	<Home LAN ip>:4532	<WAN ip>:4532	Connect a Remote RigPi direct, not through a browser. Port 4532 must be forwarded in your router.
RigPi Keyer	/dev/ttyS0	<Home LAN ip>:3000<n>	<WAN ip>:3000<n>	<n> is the account number for the Home RigPi. If your radio is connected to the first account, use <LAN ip>:30001 or <WAN ip>:30001. The port must be forwarded.
RigPi CAT CW Keyer	Select CAT plus <port>	Select CAT plus <Home LAN ip>:<port>	Select CAT plus <WAN ip>:<port>	<port> is the radio control port for Home. Your radio must support CW keying via CAT. <port> must be forwarded.
RigPi Rotor	USB to rotor	<Home LAN ip>:<n>	<WAN ip>:<n>	The rotor control port <n> is always the radio 4531 + 2 * account number. This port must be forwarded.
Mumble	rigpi4.local	rigpi4.local	<ip> i.e., 207.55.33.22	<ip> = IP address of Home WAN* on port 64738. This port must be forwarded.

*Port Forwarding in your Router is required for WAN <port>

For further trouble-shooting help, see here 242.

2.8 Using a Dynamic DNS Service

Your Internet IP can change from time-to-time, especially if you reboot your Internet modem. If you are away when this happens, you won't be able to access RSS remotely until you know

the new WAN IP. One way to solve this problem is to use a dynamic DNS service. One such service is available from

https:///www.dyn.com.

The Dyn product, Dynamic DNS Pro, costs from $55/year up to $220 for 5 years. You can also find free services. With Dynamic DNS you can choose a domain, such as w1aw.dyndns.org. When you connect from a remote location you use this URL. If your Internet IP happens to change, the domain stays the same.

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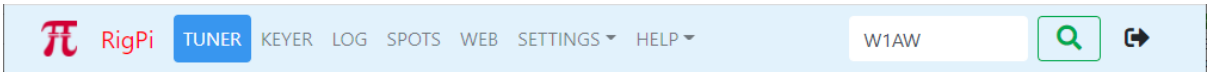
Remove this text from the manual
template if you want it completely blank.

Views

3 Views

A view is a web page viewed through any browser. Each view has common elements, a navigation bar at the top and a status bar at the bottom.

Navigation Bar

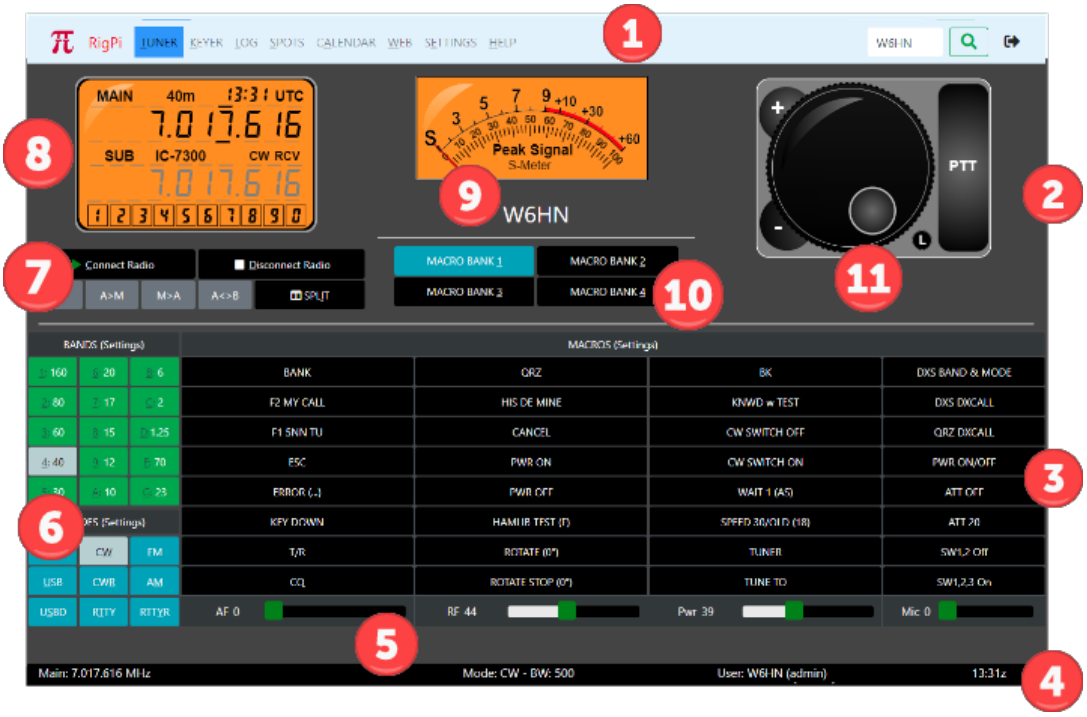


- Navigate to https://www.rigpi.net by clicking the RigPi logo or RigPi name
- TUNER...WEB: opens window
- SETTINGS: contains a list of settings windows, click the down-arrow.
- Search box: enter call to look up in the FCC database or option QRZ XML online service. Press enter or click the magnifying glass to look up
- Exit RigPi (connections to radios are preserved)

Status Bar

- Main frequency (shows red when no radio connected)
- Split frequency (shows when radio is in the split mode)
- Mode and Bandwidth
- User, user's call and account username
- UTC Time

3.1 Tuner



1: Navigation Bar

- Navigate to https://www.rigpi.net by clicking the RigPi logo or RigPi name.
- TUNER...WEB: opens window.
- SETTINGS: contains a list of settings windows, click the down-arrow.
- HELP: sources of help for RigPi.
- Search box: enter call to look up in the FCC database or optional QRZ XML online service. Press enter or click the magnifying glass to look up.
- Exit RigPi.

2: Tuning Knob

- Tap/click the detent and rotate knob to tune higher/lower in frequency. The tuning scale is determined by the underlined digit in the frequency readout of the Frequency Panel.
- Tap/click/hold the plus or minus button to move up or down in frequency. Hold tunes in the same direction at the rate of 2 steps per second.
- Tap/click/ the PTT button to engage the RSS PTT function The PTT button can be configured as a toggle or momentary switch.
- **L** is a Tuning knob frequency lock button. Tap to lock the frequency.

When using the Macro Decimal mode to control external relays, a row of LED lights appears below the Tuning Knob. Tap/click a light to turn on an associated relay, tap/click again to turn it off. One slave connection is available for all accounts. If you attempt to connect more than one RigPi will show an alert telling which account is

already using the slave connection. A radio must be connected before relays can be controlled.

3: Macro Bank

- 128 macros with 4 banks of 32 programmable macro buttons (SETTINGS>Macros). Macros can be used to send CW, control the radio through Hamlib commands, control the radio through Hamlib "w" commands unique to the selected radio, control relays, look up web information, and send system commands (the system command option is disabled by default). Change the Macro Bank using the a Macro Bank button (10) or a custom macro.

4: Status Bar

- Main frequency (shows red when no radio connected)
- Split frequency (shows when radio is in the split mode)
- Mode
- Passband (BW)
- User, user's call and account username
- UTC Time
- Only the Main Frequency is displayed in narrow screens

5: Sliders

- Sliders are hidden if your radio doesn't support changing levels by CAT.
- 4 sliders are provided: AF (AF Level); RF (RF Gain); PWR (Power Output Level); MIC (Mic Level).* The sliders adjust the radio front panel controls, not the CODECs (if appropriate for your radio) or Mumble.
- Sliders can be set with a maximum level or disabled (SETTINGS->Slider Overrides)

*If you find your radio is not responding correctly to sliders, analog level reading for that radio may not be fully implemented. In addition, some radios only support several fixed levels for a slider rather than a continuous range. Please post a note on the RigPi Forum to let us know of any problems you encounter.

6: Band and Mode

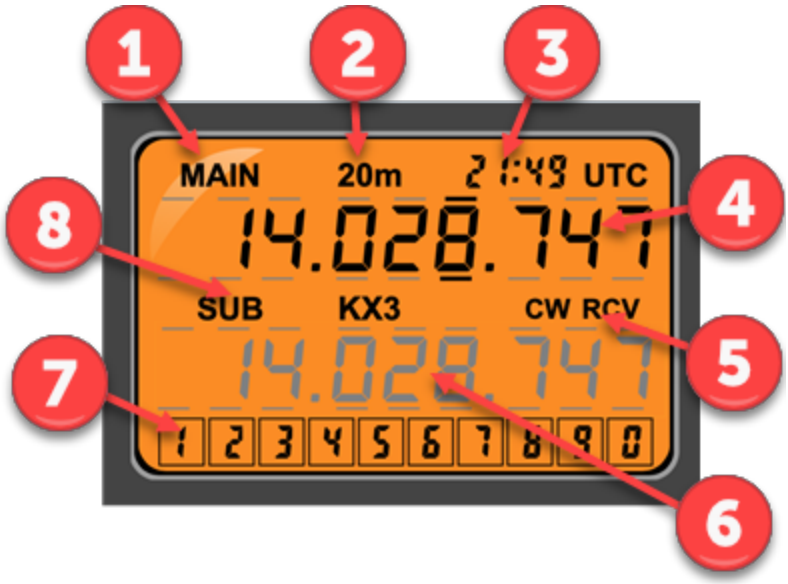
- Tap a Band button to change bands or a Mode button to change modes. Each band has a memory for the frequency and mode last used on that band. The selected Mode and Band buttons are highlighted.
- Band buttons can be disabled (SETTINGS->Band Filter) Modes that are not supported by the radio are disabled.

- RigPi relies on the Radio to remember the desired bandwidth for each mode. If a radio (such as Hamlib Dummy) doesn't support this requirement, you can use the TUNE TO macro to set the bandwidth.

7: Radio Connection and VFO

- Optionally turn on radio power and Connect Radio (Green: connected; Red: not connected; Rotating Arrows: connecting). See Advanced Radio Settings.
- Disconnect Radio and optionally turn off Radio power. See Advanced Radio Settings.
- VFO/Memory operations (memory options enabled when split is on)
- See below for details

8: Frequency Panel



When screens are wide enough to display the RSS S-meter, the frequency panel, above, is used.

For narrow screens, where the S-meter is hidden, this format is used.

- Displays the Main and Sub VFO frequencies, band, the current UTC time, operating mode and receive/transmit status.
- A keypad is included to set the frequency of selected digits. See below for all tuning options.
- The Main and Sub frequencies have bars above and below each digit. When a digit is selected the bars above and below the digit are bold. Tap/Click a digit to select it. The selected digit sets the tuning resolution for the Knob and typed digits. Click the lower half of a digit after selection to tune down and the upper half to tune up.
- Change the color theme of the Frequency Panel using Account Settings (SETTINGS>Accounts>Edit). Four options are provided: Orange, Night, LCD, and High Contrast. This setting also affects the S-Meter.

Callout	Use
1	Information for Main VFO
2	Current band
3	Time (GMT)
4	Main frequency
5	Mode and transmit/receive status
6	Sub VFO information
7	Keypad for entering digits
8	Sub label and radio name
9	Tap to open keypad
10	S-meter

9: S-Meter

- Shows signal strength when in receive and an optional reading when in transmit. There is no way to adjust the calibration of the S-meter. Some radios may not support S-meter and/or optional transmit queries through CAT. The S-meter is not shown on

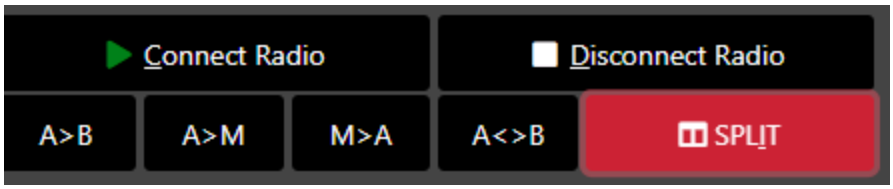
narrow screens. See the Advanced Radio settings (SETTINGS>Radio>Advanced) for more information on the optional transmit readings.
- Change the color theme of the S-meter using Account Settings (SETTINGS>Accounts>Edit). Four options are provided: Orange, Night, LCD, and High Contrast. This setting also applies to the Frequency Panel.

10: Macro Bank

- Macro Bank to change the displayed bank

Radio Connection and VFO Buttons

The VFO frequency Swap buttons operate when in Split mode.



Button	Function
Connect Radio	Connect the radio for this account. You must set the radio up the first time in SETTINGS>Radio. Green: connected; Red: not connected; Rotating Arrow: connecting. The control will turn on radio power before connecting if the radio is off (supported radios only).
Disconnect Radio	Disconnect the radio and turn off power (supported radios only) for this account.
A>B	Copy the Main frequency to the Sub frequency (memory functions are enabled when in split mode).
A>M	Copy the Main frequency to the RSS frequency memory. This function does not use the memory in the radio.

Button	Function
M>A	Copy the frequency in the RSS memory to the Main VFO
A<>B	Swap the Main and Sub VFO frequencies.
SPLIT	Turn on split for the radio. The Main VFO is used for receiving and the Sub VFO is used for transmitting. Some Hamlib radios do not support split operation. Others cause readout flicker when reading or setting split frequency (especially Icom radios). Split polling can be turned off in Radio settings (SETTINGS>Radio>Advanced).

Frequency Tuning

Tuning options allow you to tune both Main and Sub VFO's in many ways.

Option	Operation	Mobile Device Support
Knob	Rotate to tune frequency up or down. Click a digit to set tuning resolution.	Yes
Knob +	Tune up one step, determine resolution by clicking a digit.	Yes
Knob -	Tune down one step, determine resolution by clicking a digit.	Yes
Click digit	Click digit to select, then click upper half to tune up or lower half to tune down.	Yes
Mouse wheel (or Shift+Mouse wheel)	Rotate to tune up or down, click digit to set resolution.	No
Keyboard >	Move selection to next digit to right.	No

Option	Operation	Mobile Device Support
Keyboard <	Move selection to next digit to left.	No
Keyboard ^	Tune selected digit up.	No
Keyboard v	Tune selected digit down.	No
Keyboard [	Down one band	No
Keyboard]	Up one band	No
Click frequency buttons	Available for wide screens. Select starting digit, then click a value and the selection moves to the next digit.	No
Type frequency (via Keypad)	Availaboe for narrow screens, such as phones. Tap/click starting digit, then tap/click numbers in the keypad. Each time you change a digit, the selected digit moves to the right where you can enter a new digit.	Yes

Shortcut Keys

Shortcut keys on the Tuner window provide quick access to many functions. The table below describes these keys. These keys include the Frequency Tuning keys, above. To see a list of all shortcut keys, use ? on your keyboard.

Shortcut	Function
Alt+T	Tuner
Alt+K	Keyer
Alt+L	Log
Alt+A	Calendar

Shortcut	Function
Alt+W	Web
Alt+E	Settings
Alt+H	Help
Alt+X	Log Out
/	Lookup Call
?	Shortcut List
Alt+C	Connect Radio
Alt+D	Disconnect Radio
Alt+1	Macro Bank 1
Alt+2	Macro Bank 2
Alt+3	Macro Bank 3
Alt+4	Macro Bank 4
+	Frequency Up
-	Frequency Down
Up Arrow	Frequency Up
Down Arrow	Frequency Down
Spacebar	Transmit
Left Arrow	Frequency Select Digit Left
Right Arrow	Frequency Select Digit Right

Shortcut	Function
ESC	Close Popup
[	Band Down
]	Band Up
Ctrl+1	160M
Ctrl+2	80M
Ctrl+3	60M
Ctrl+4	40M
Ctrl+5	30M
Ctrl+6	20M
Ctrl+7	17M
Ctrl+8	15M
Ctrl+9	12M
Ctrl+A	10M
Ctrl+B	6M
Ctrl+C	2M
Ctrl+D	1.25M
Ctrl+E	70cm
Ctrl+L	LSB
Ctrl+W	CW
Ctrl+F	FM

Shortcut	Function
Ctrl+U	USB
Ctrl+R	CWR
Ctrl+M	AM
Ctrl+S	USBD
Ctrl+T	RTTY
Ctrl+Y	RTTYR

The Shortcut Keys are useful for external controllers, such as the TourBox. There is a sample RigPi Configuration file for TourBox. You can download it from RigPi TourBox.

Push-to-Talk

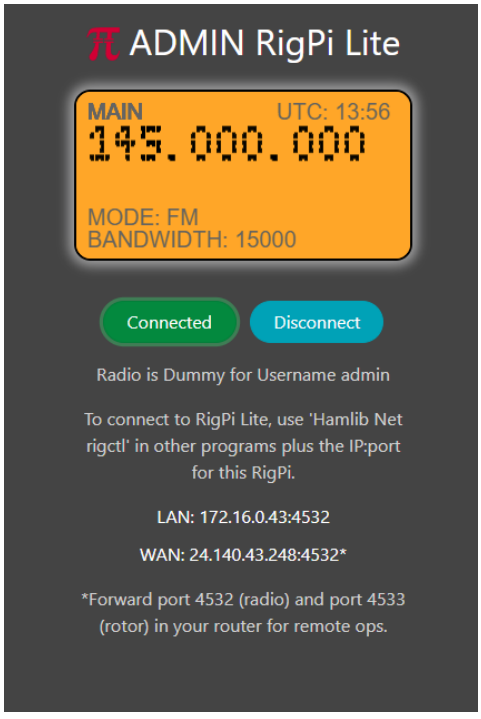
Several ways to engage Push-to-Talk (PTT) are provided. PTT uses CAT (software) and solid state switches (hardware) on the RigPi Keyer and RigPi Audio boards. See SETTINGS>Radio>Advanced for PTT options. See also Keyer settings for alternative ways to use the RigPi Keyer board PTT.

PTT can be Latching (tap to transmit, tap again to receive) or Momentary (hold to transmit, release to receive).

Option	Operation	Mobile Device Support
PTT to right of Tuning Knob	Latch or Momentary PTT	Yes
T/R Macro button	Latch PTT	Yes
Space bar	Latch or Momentary PTT	No

3.2 RigPi Lite

RigPi Lite provides a low cpu-utilization connection for other programs that use Hamlib to control radios and rotors. Examples include RigPi, WSJT-X and Fldigi.



RigPi normally uses 25-30% of a Raspberry Pi CPU resources. RigPi Lite uses less than 1%.

Starting RigPi Lite

RigPi Lite uses the same login credentials as RigPi and connects through port 80. Set up the account you want to use for RigPi Lite using the RigPi Account, Advanced Settings and Rotor Settings. Once you are done, check that RigPi controls the radio and rotor correctly. Disconnect the radio in RigPi, then start RigPi Lite. In your browser navigation bar, use the URL:

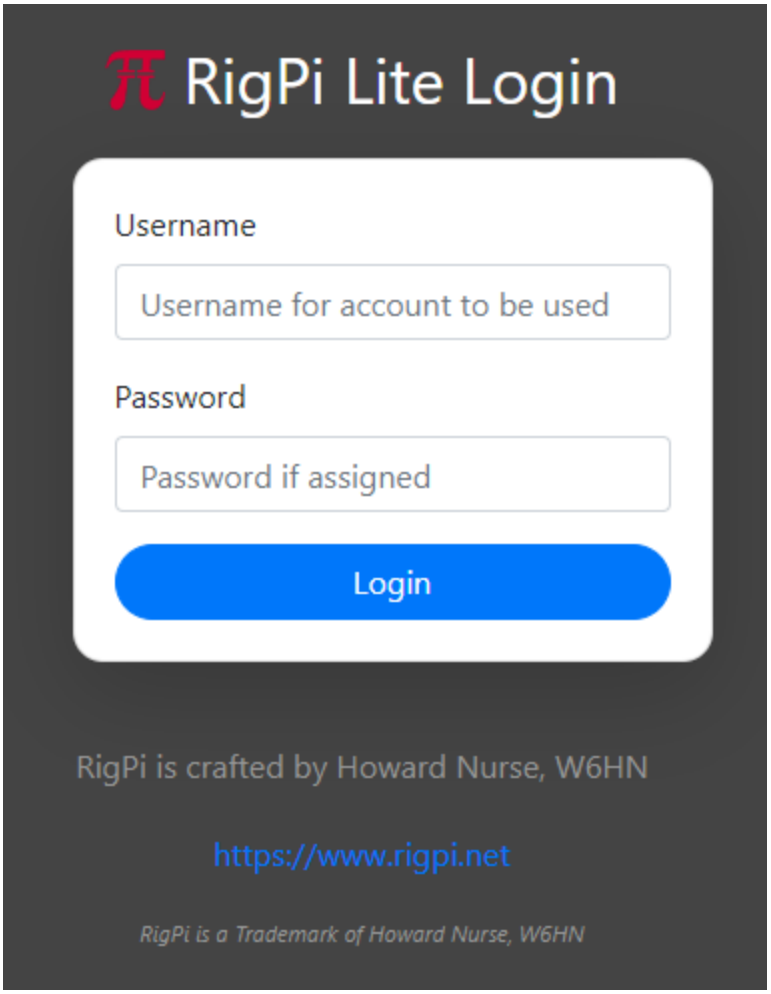
rigpi4.local/lite

or the LAN/WAN shown in the Lite window.

If you are operating through a router and have redirected port 80, you must take that into account when configuring RigPi. For example, if your router forwards port 8008 to port 80, start RIgPi Lite by specifying the port.

rigpi4.local:8008/lite

A start-up icon for RigPi Lite is located on the Raspberry Pi Desktop and in the Chromium App menu.



1. Enter the Username for the account you want to use, for example, 'admin.' The Username is case-insensitive.
2. If you have assigned a Password, enter it in the Password box.
3. Click Login (or press Enter).

Lite Window

in the Lite window, click Connect or press Enter to connect.

The Lite window shows the current Main frequency, mode, bandwidth, UTC time, and Transmit status. The display is updated every 2 seconds.

Other helpful information is provided below the buttons.

1. The radio name and Username
2. The LAN and WAN <IP>:<port> for the connection.

If you want WSJT-X to use the RigPi Lite connection, and you are using the same LAN, use the LAN data. If connecting from another location, use the WAN data. To use the WAN connection, be sure to forward the appropriate port in your router. In the image above, you would forward port 4532 in your router. To use your rotor, forward the port one higher, or 4533.

The RigPi Lite window does not use proprietary widgets, but uses the HTML5 canvas. RigPi Lite takes the first step to replacing the proprietary widgets in RigPi.

Connecting to RigPi Lite

Using a second RigPi:

Use the <IP>:<port> shown on the RigPi Lite window. In Advanced Settings, use Hamlib Net Rigctl, and R Port 172.16.0.43:4534. This will connect to RigPi account 2. Replace the IP with your IP. Take into account router redirection if you are connecting from a remote location.

WSJT-X:

If WSJT-X is running on the same RigPi as RigPi Lite, use 127.0.0.1:4534 in the WSJT-X Radio->Network Server box to connect to the radio for account 2. If WSJT-X is running at a remote location, use he WAN IP and port shown in the Lite window. WSJT-X connects through the specified port, so you must port forward that port in your router.

Rotor control:

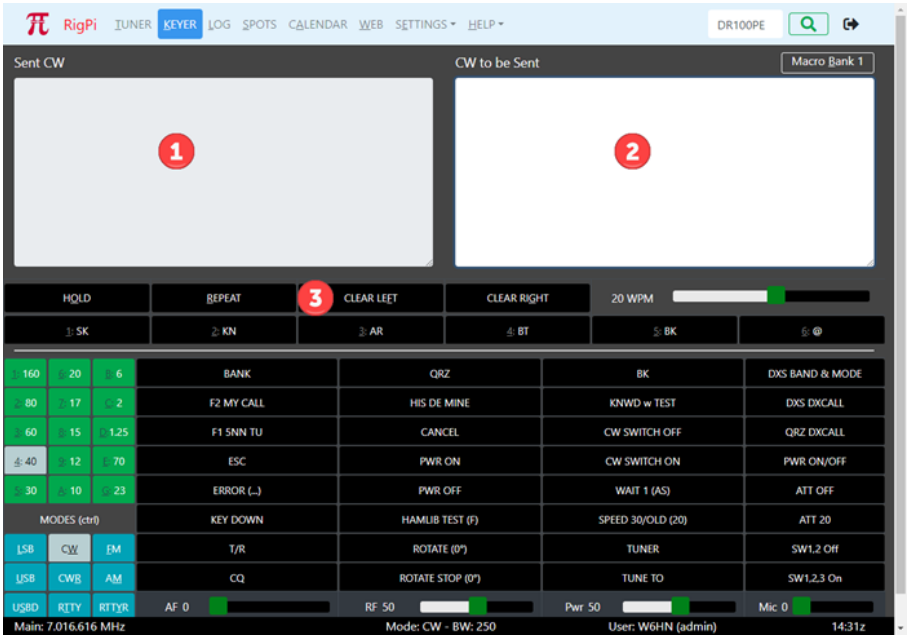
In RigPi, set the Rotor to Hamlib Net rotctl.

Use the LAN or WAN on the RigPi Lite window to connect to the RigPi Lite rotor control. The port in RigPi Rotor Settings is one higher than the port shown in the Lite window. If you are using port 4534 for the radio, use port 4535 for the rotor.

RigPi Lite limitations

1. No radio or rotor control, control comes from another program. RigPi Lite is display-only.
2. Only CAT CW is supported, your radio must support CW by CAT.
3. No logging to or from other programs.
4. Auto power on and auto power off are determined from your selections in RigPi Advanced Radio Settings.

3.3 Keyer



1: Sent CW

- Displays CW already sent to transmitter. Only RigPi Keyer and WinKeyer support this function.
- Clear the sent data by clicking/tapping CLEAR LEFT.
- In HOLD mode, use backspace to delete text you don't want to send.

2: Typed CW

- CW characters sent to the Transmitter or waiting to be sent. All keyers support this function.
- Clear by click/tap CLEAR RIGHT.

3: CW Keyboard special characters

- See below

Button	Function
HOLD	Allow type-ahead without transmitting.

Button	Function
REPEAT	Repeat characters in 'to be sent' panel.
CLEAR LEFT	Clear all text from the left panel.
CLEAR RIGHT	Clear all text from the right panel.
WPM	Slider to increase/decrease the current speed.
SK	Send SK prosign.
KN	Send KN prosign.
AR	Send AR prosign.
BT	Send BT prosign.
BK	Send BK prosign.
@	Send @ sign.

Band and Mode

- Tap a Band button to change bands or a Mode button to change modes. Each band has a memory for the frequency and mode last used on that band. The active Mode and Band buttons are highlighted.
- Band buttons can be disabled (SETTINGS->Band Filter)
- If the current radio doesn't support a mode (i.e. USB-D) that mode button is disabled.

Shortcut Keys

Shortcut keys on the Keyer window provide quick access to many functions. The table below describes these keys. Note this list is not available by using the ? key, but is provided below for reference.

Shortcut	Function
Alt+1	SK

Shortcut	Function
Alt+2	KN
Alt+3	AR
Alt+4	BT
Alt+5	BK
Alt+6	@
Alt+T	Tuner
Alt+K	Keyer
Alt+L	Log
Alt+A	Calendar
Alt+W	Web
Alt+E	Settings
Alt+H	Help
Ctrl+2	80M
Ctrl+3	60M
Ctrl+4	40M
Ctrl+5	30M
Ctrl+6	20M
Ctrl+7	17M
Ctrl+8	15M
Ctrl+9	12M

Shortcut	Function
Ctrl+A	10M
Ctrl+B	6M
Ctrl+C	2M
Ctrl+D	1.25M
Ctrl+E	70cm
Ctrl+L	LSB
Ctrl+W	CW
Ctrl+F	FM
Ctrl+U	USB
Ctrl+R	CWR
Ctrl+M	AM
Ctrl+S	USBD
Ctrl+T	RTTY
Ctrl+Y	RTTYR
Alt+X	Exit to Login Screen

3.4 Log

1: Navigating

Use the Log navigation bar at the top left of the log under the RSS navigation bar to move from page-to-page. Up to 25 QSOs are shown on each page. Navigate to any page in your log using the drop-down page list.

2: Log Name and Log style

Each log has a name and a style. By using distinct names you can maintain separate logs, using styles for contests or different accounts.

The name and style are shown at the center of the Log navigation bar. The number after the style shows the number of contacts for that log.

Each log has its own style appropriate for its use. A log can be designed for any purpose, such as Field Day, a DX contest, or for general use. Use the Log Designer (SETTINGS>Log Designer) to design or modify the fields and field order that appear in each log.

The log style can be changed to a different style from the Style (book icon) button. The Log can be selected from the Log (folder icon) button.

Log styles are created and edited in the Log Designer window. Accounts can share logs and log styles.

3: Add a new Contact

Click the + (plus) button to add a contact to the current Log. The Log Editor window opens where you can add details for the contact and load information from the Callbook Lookup. See the Log Editor topic for details.

4: Filtering QSO's

Click the filter (funnel icon) button to show contacts matching the call in the Callbook lookup box in the top right of the RSS navigation bar. Click the filter button again to show all contacts.

5: Export/Import ADIF

Amateur Data Interchange Format (ADIF) is the data import/export standard for amateur radio logs. It allows logbook data to be easily transferred from one program to another. ADIF is also the basis for submission of logs to the ARRL Logbook of the World (LoTW) and other online logging systems. All downloads compress the ADIF file to the ZIP format. Export transfers the ADIF from RSS to the local downloads folder usually on another computer. Import transfers an ADIF file to RSS.

Export to Downloads Folder

Download all QSO's in the current log to the Downloads folder. If using RigPi from the RSS Desktop, the Downloads folder is the one for RSS. If connecting to RSS from a remote computer, the Downloads folder for that computer is used.

The file is given a name like rigpi<YOURCALL><Logname>-<n>.zip. For example, a file containing my Mobile log would be named rigpiW6HNMobile.zip (first download) or rigpiW6HNMobile-1.zip (second download).

To download all QSO's from all logs, select the ALL Logs option from the Log list (folder icon).

Export Selected Q's

Download the selected QSO's. To select QSO's the Select column must appear in the Log. The Select column can be added using the Log Designer opened from SETTINGS>Log Designer.

Export for LoTW

Download all QSO's in the current log with a subset of fields appropriate for LoTW.

Export Selected Q's for LoTW

Download selected QSO's in the current log using a subset of fields appropriate for LoTW.

Import

Upload files must not be compressed and have an extension .adi. For example, my upload file might be named W6HN-11-12-2018.adi. RigPi asks you to identify the file you wish to upload. RigPi then proceeds to import the adi file into the currently open logbook.

6: Editing an Existing Contact

Click the Edit button on the left end of a logged contact to open the Log Editor for that contact. See the Log Editor topic for details.

7: Delete Contacts

Click the Delete button on the right end of a QSO line to delete that contact.

Entire Log

In the drop-down menu, deletes all contacts from the currently open log. If ALL Logs is selected, all QSO's are deleted from all logs.

Selected Q's

In the drop-down menu, deletes the selected QSO's from the currently open log. To select QSO's the Select column must appear in the Log. The Select column can be added using the Log Designer opened from SETTINGS>Log Designer.

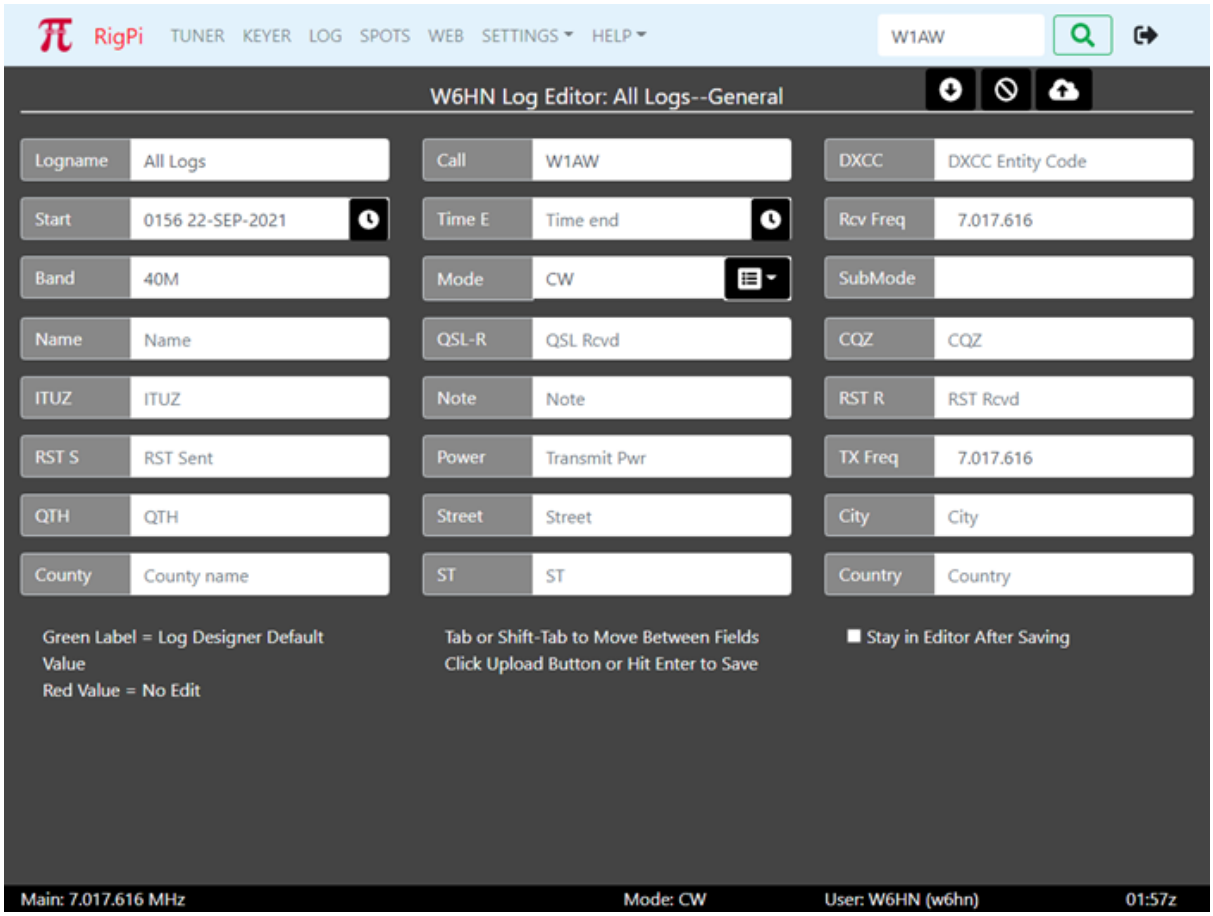
Sorting Contacts

Click the Up/Down arrowhead in a column header to sort the log by that column. Click again to sort in the opposite direction. To return to date order, click the Start header.

3.4.1 Log Editor

Use the Log Editor to add new or edit existing contacts. The Log Editor is opened by clicking an Edit button on the Log window, or by clicking the + button at the top to start a new contact.

The Log Designer (SETTINGS>Log Designer) sets the fields, field order, and label for each edit box. You can also set defaults for each field and select the contents you want to appear in a drop-down list.



Fill fields from the callbook for the call in the Call field by clicking the down-arrow at the top. The onboard FCC database is used unless you have enabled the online QRZ XML (subscription) option.

The Rcv Freq, TX Freq, Band and Mode boxes are filled automatically from the radio when you create a new contact. If you wish to manually enter the data for these boxes, disconnect the radio from RigPi using the Tuner or Radio settings window.

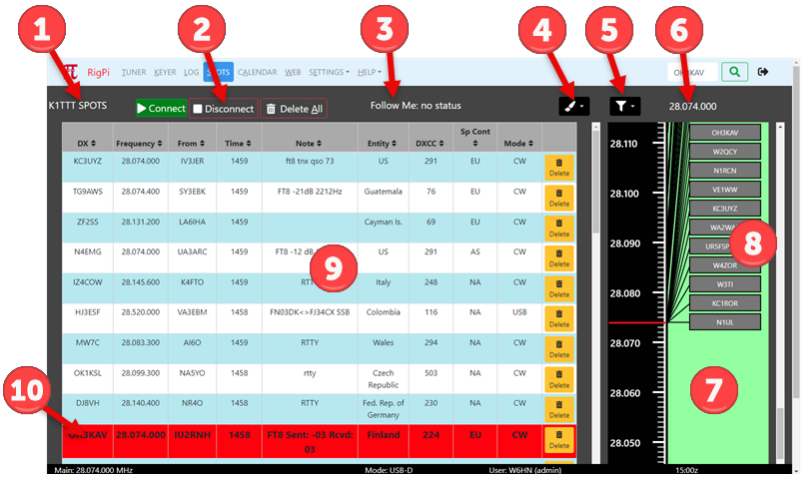
Cancel any changes by clicking the stop button at the top.

Save the contact by clicking the cloud up-arrow at the top.

By putting a check in the Stay in Editor After Saving option, the Log Editor will stay open so you can continue to add new contacts.

Information coming from a default setting in the Log Designer is designated by the label for that field given a green color. If a field has been designated as "no edit," such as a record number, the value is shown in red.

3.5 Spots



The RigPi spots shows DX spots provided by one of a large number of DX Cluster Telnet sites. The site you wish to use is selected in SETTINGS>Spots. See the Settings Spots window topic for details. Click a spot to tune instantly to the frequency and operating mode reported for that spot. The selected spot background is red. Double-click a spot to queue that spot. Queued spots serve as placeholders and the rig remains tuned to the red spot. To convert a yellow spot to a red spot, click the yellow spot.

A band map centered on the Tuner frequency shows all nearby spots. Click a spot to tune to the reported frequency and mode for that spot. The spot in the spot list has a red background.

1: Spot Source

- RigPi is connected to this Telnet spot source.

2: Connect/Disconnect/Delete

- Connect to specified Telnet site, or disconnect. Select the spot server you want to use in SETTINGS->Spots. If the connection is successful after clicking Connect, a dialog confirms that the connect is good. If the connection fails, the dialog tells you so and the button turns red. Failure to connect can be due to the spot server not being active. Try another server.
- Delete All removes all spots. You must be connected to a spot server for this to work.

3: Spot Filter and Spot Color

- Spots are filtered by the Band and Mode options selected in the Filter (funnel icon) drop-down list.
- Spots are colored depending on the color rule selected in the Color (paintbrush icon) drop-down list.

4: Color Rule

- Spots are colored depending on the color rule selected in the Color (paintbrush icon) drop-down list.
- Call fields are colored by call rules.
- Entity fields are colored by entity rules.

Color	Rule
None	No color used
Teal	Call worked before (logged)
Green	Call confirmed
Orange	Call worked before on this band (logged)
Red	Call confirmed on this band
Teal	Entity worked before (logged)
Green	Entity confirmed
Orange	Entity worked before on this band (logged)

Color	Rule
Red	Entity confirmed on this band

5: Spot Filter

- Spots are filter based on Band and Mode by selections in this drop-down list.

Filter	Rule
Band	All Spots: all spots (no band filter)
Band	Follow Me: spots on same band as Tuner
Band	HF: HF spots
Band	Low Bands: low band spots
Band	High Bands: high band spots
Band	WARC: spots on WARC bands
Band	VHF/UHF: VHF/UHF spots
Band	160
Band	80
Band	60
Band	40
Band	30
Band	20
Band	17
Band	15

Filter	Rule
Band	12
Band	10
Band	6
Band	2
Mode	Show All: all spots (no mode filter)
Mode	Follow Me: spots using same mode as Tuner
Mode	Only CW: only CW spots
Mode	Only Phone: only phone spots
Mode	Only Digital: only digital spots

6: Frequency

- Current operating frequency

7: Band Map

- Spots near operating frequency

8: Spots

- Click spot to tune to spot frequency and mode.

9: Spot List

- Spots from current DX Cluster Telnet site.
- Sort the list by clicking the header, again to show the opposite order.
- With the mouse pointer over a spot row the Filter, number of minutes since spotted, and spotter are displayed in a tool tip.
- RigPi checks the reported mode against the modes the current radio supports. For example, the Hamlib Dummy radio does not support USB-D, so USB is used instead. If

the spot is on a normal FT-8 frequency or 'FT8' is found in the note, USB-D is used for the mode unless the radio doesn't support USB-D.

10: Selected Spot

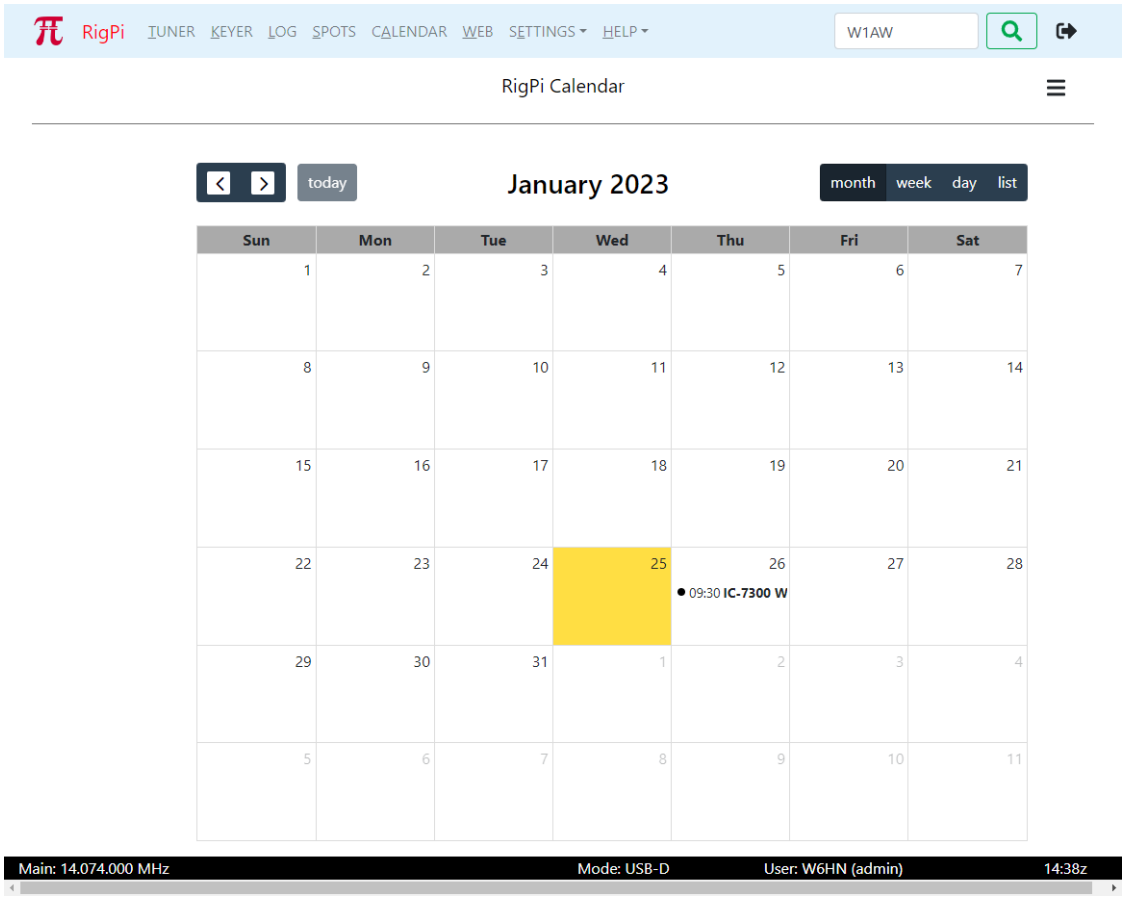
- Click spot to tune to spot frequency and mode.

Lock list

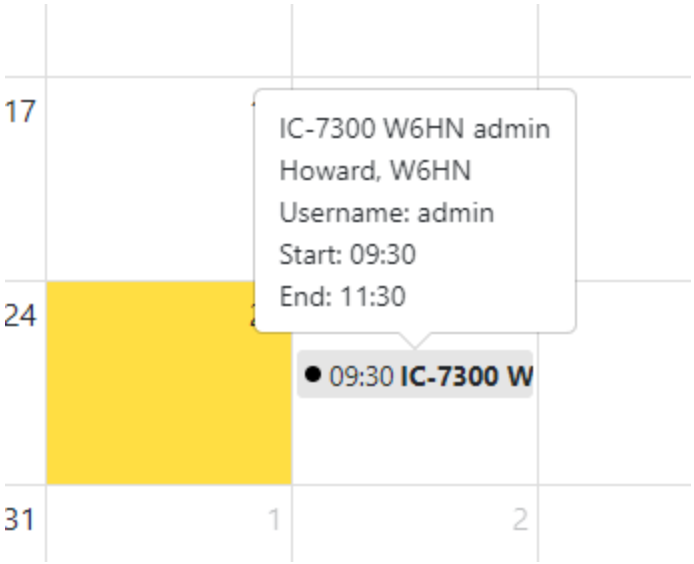
Alt+C	Connect to cluster
Alt+i	Disconnect from cluster
Alt+D	Delete all spots
Ctrl+home	Lock list to top
Ctrl+h	Lock list to top
Ctrl+end	Lock list to end
Ctrl+e	Lock list to end
Ctrl+delete	Find yellow spot
Ctrl+y	Find yellow spot
Ctrl+insert	Find red spot
Ctrl+r	Find red spot
Alt+S	Reload to refresh spot list and remove selection

3.6 Calendar

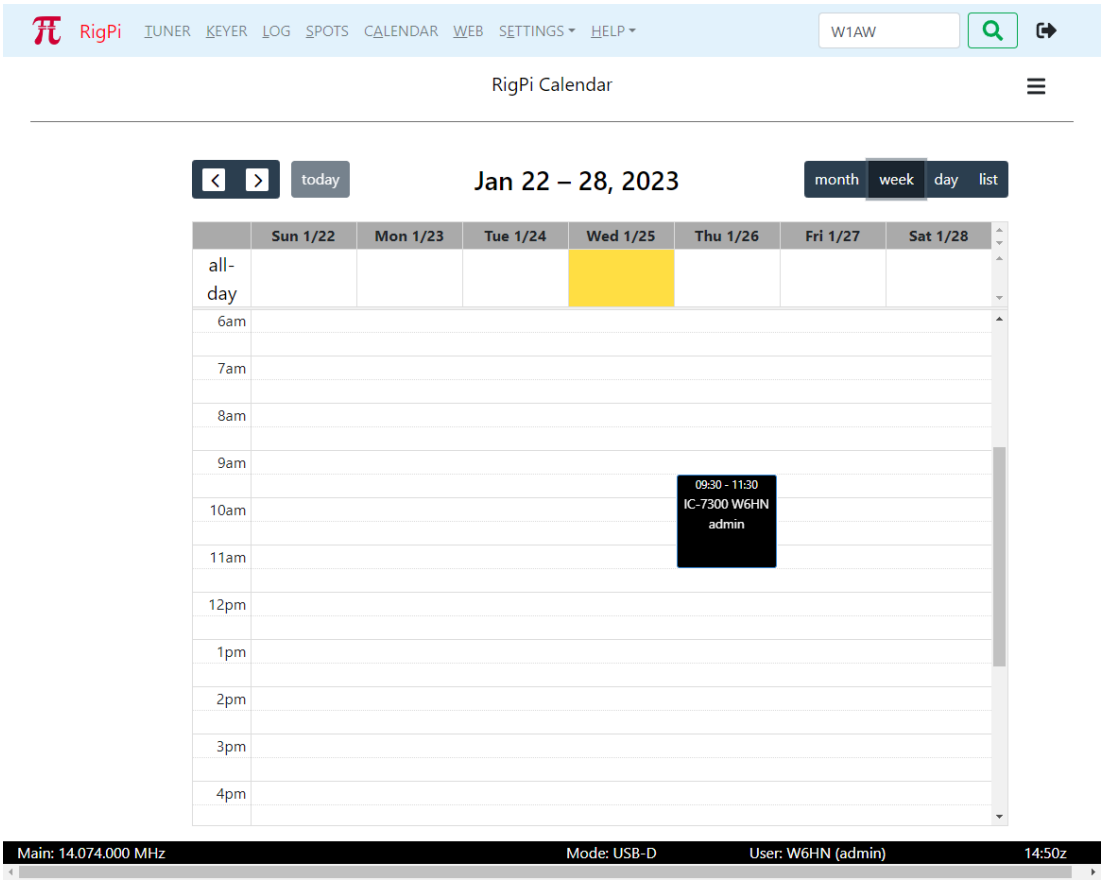
RigPi Calendar is the calendar display for RigPi users. Set up events for Calendar in the Scheduler settings window 150. Calendar events include reservations for rig use and custom events such as club meetings or skeds. You can overlay the Calendar with event lists from external sources, such as operating contest schedules.



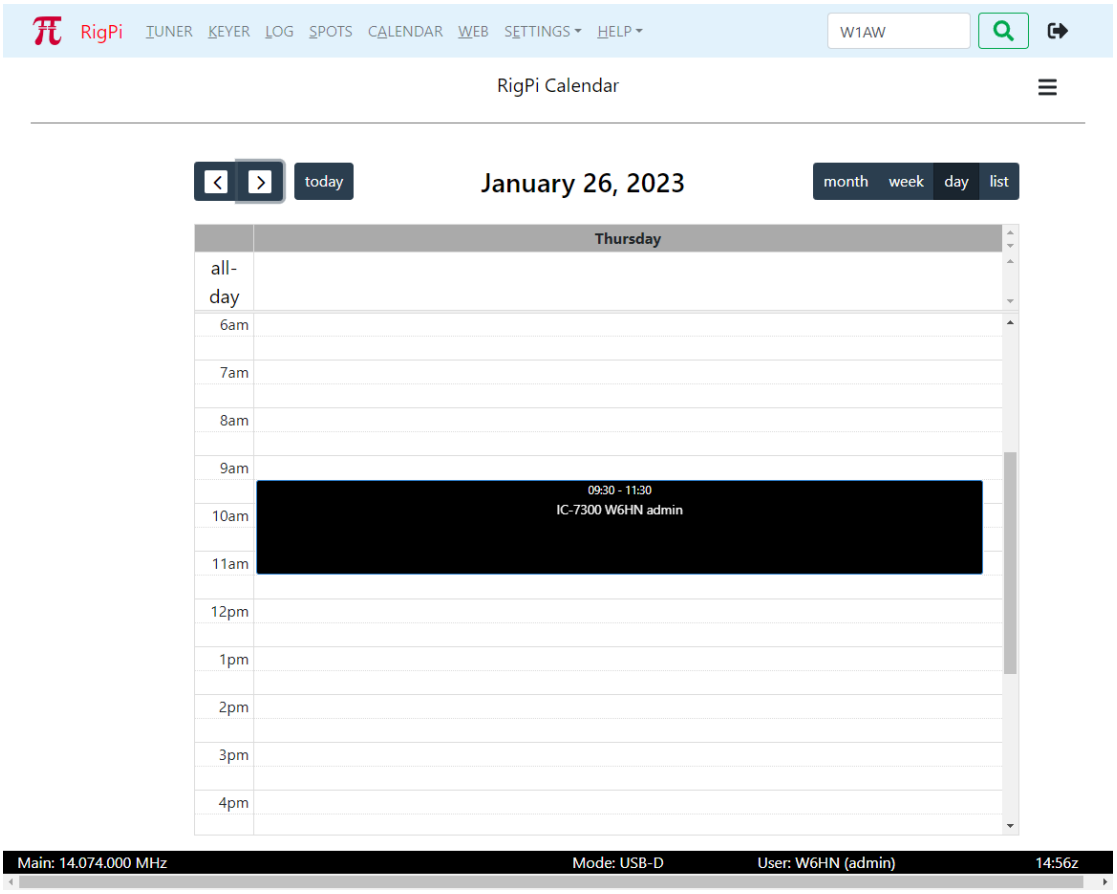
Hold the mouse pointer over an event to see a tooltip with more details. The day with a yellow background is today's date.



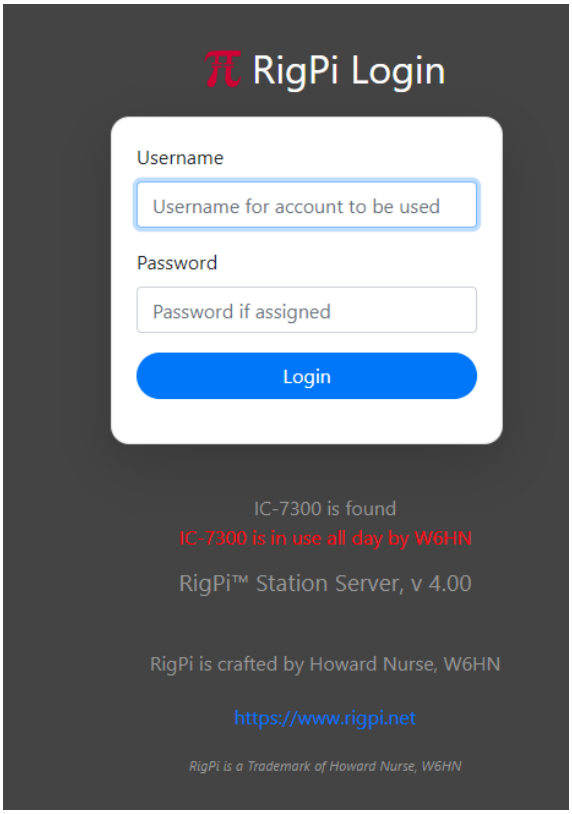
The Calendar Week view shows all events for the selected week.



RigPi Calendar Day view

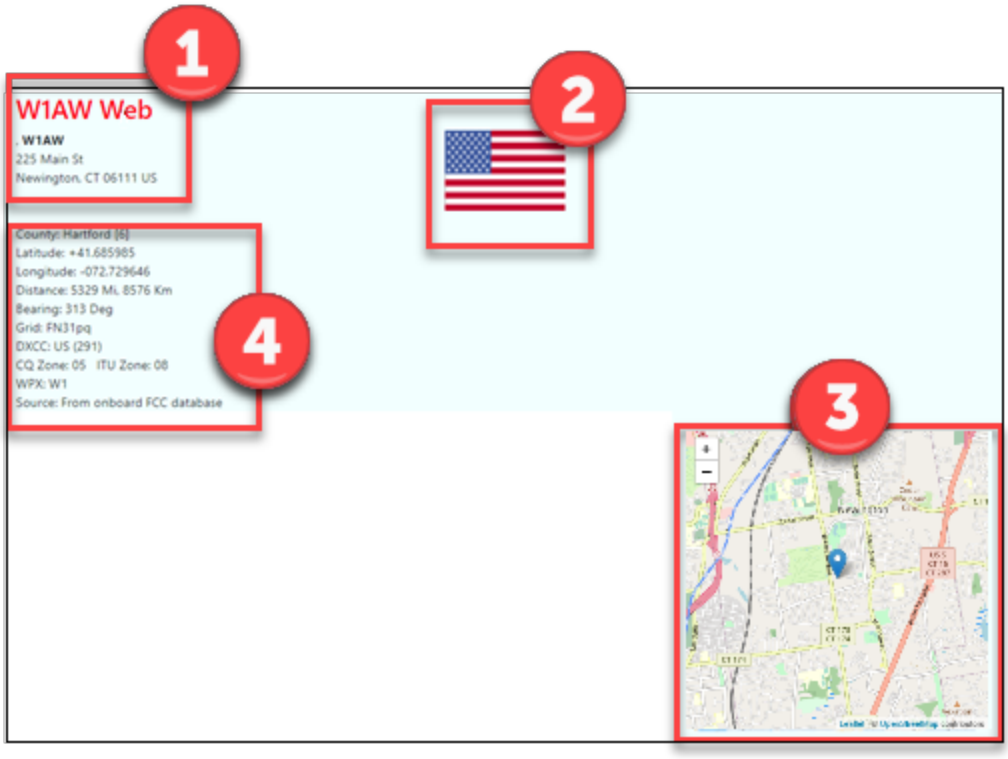


Drag the event line to change the event start time in the Event Scheduler. Drag the bottom edge of an event to adjust the end time for that event in Event Scheduler.

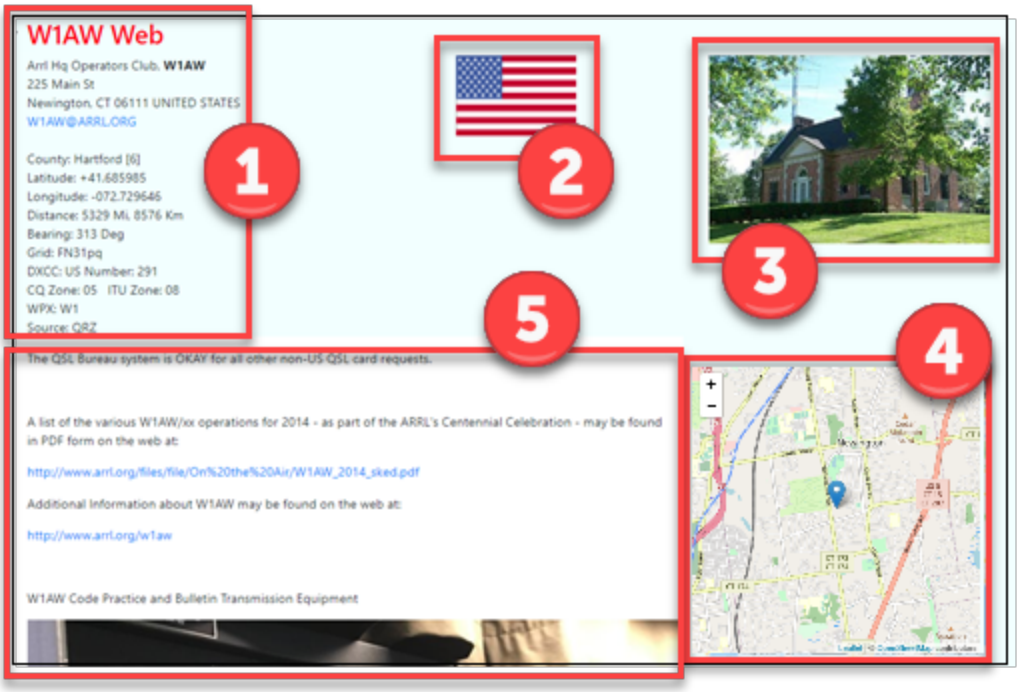


Radios found on RigPi are shown on the login screen, plus any upcoming reservations.

3.7 Web



Web page for W1AW obtained from FCC data



Web page for W1AW obtained from QRZ XML data

Callbook data for the Web page is obtained from the FCC database installed on RSS (US calls), entity databases installed on RSS (US and other calls), or QRZ data obtained through the QRZ.com XML subscription service. When the QRZ service is used, more information is included, especially for non-US calls. This extra information can be additional station details, the primary photo, and biographical text (which can also include additional photographs).

FCC Data

The FCC amateur radio database is provided with RSS. An update function is provided in System settings (SETTINGS>System) that can be used periodically to update the data.

1: Contact Information

2: Entity Flag

3: World Map

- Centered on approximate coordinates
- Zip code is used for US calls.
- Country center is used for non-US calls.

4: Additional Info

- RSS Entity databases provide this information.

QRZ Data

QRZ data is available on QRZ.com through a subscription service. More information on their subscription plans can be found on the QRZ.com site. RSS requires a QRZ username and QRZ password to utilize this service. If you do not have a QRZ XML subscription, the included FCC database is used for US calls.

1: Contact Information

2: Entity Flag

3: Primary Photo

- This photo is the image shown when you look up a call on QRZ.

4: World Map

- The map is centered on coordinates from the QRZ database.

5: Biographical Info

- The text is taken from the Biography in the QRZ database for this call.
- The text may include images and animated gifs.

This page is intentionally left blank.
Remove this text from the manual
template if you want it completely blank.

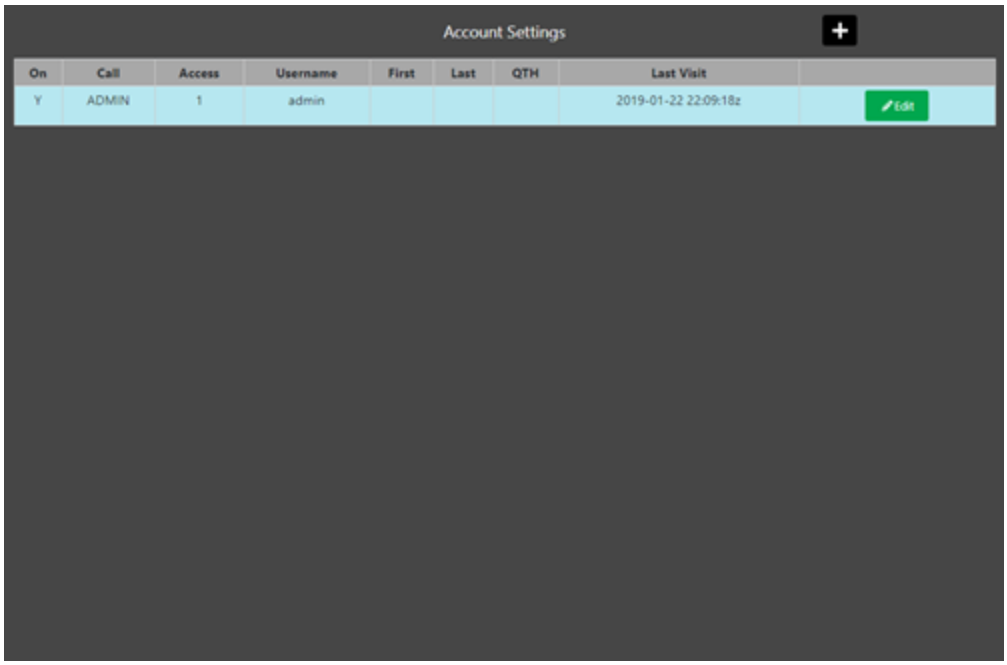
Settings

4 Settings

RSS is customized using settings windows. The settings, except for System, are unique for each account.

Many settings get their data from drop down lists. It is not possible to directly edit the contents of the text boxes associated with these lists so the text box contents have a gray background as a reminder.

4.1 Account



All accounts having access to RSS are listed in the Account settings list (SETTINGS>Accounts). The list shows whether or not the account is in use, the access security level for that account plus more. Account Settings is only available for Access level 1 accounts.

Editing User Accounts

Edit any user account by clicking the green Edit button at the right end of each list line.

Deleting User Accounts

The primary account, ADMIN at first, can't be deleted. Accounts added after the primary account can be deleted by clicking the red Delete button at the right end of each row in the Account list.

Creating new User Accounts

In the Account Settings window, click Add (plus button at top) to add a new account. Use the guidelines above to complete the form. Once the account is saved by clicking the Up Arrow at the top, the Login window appears so you can test the new account or return to another account.

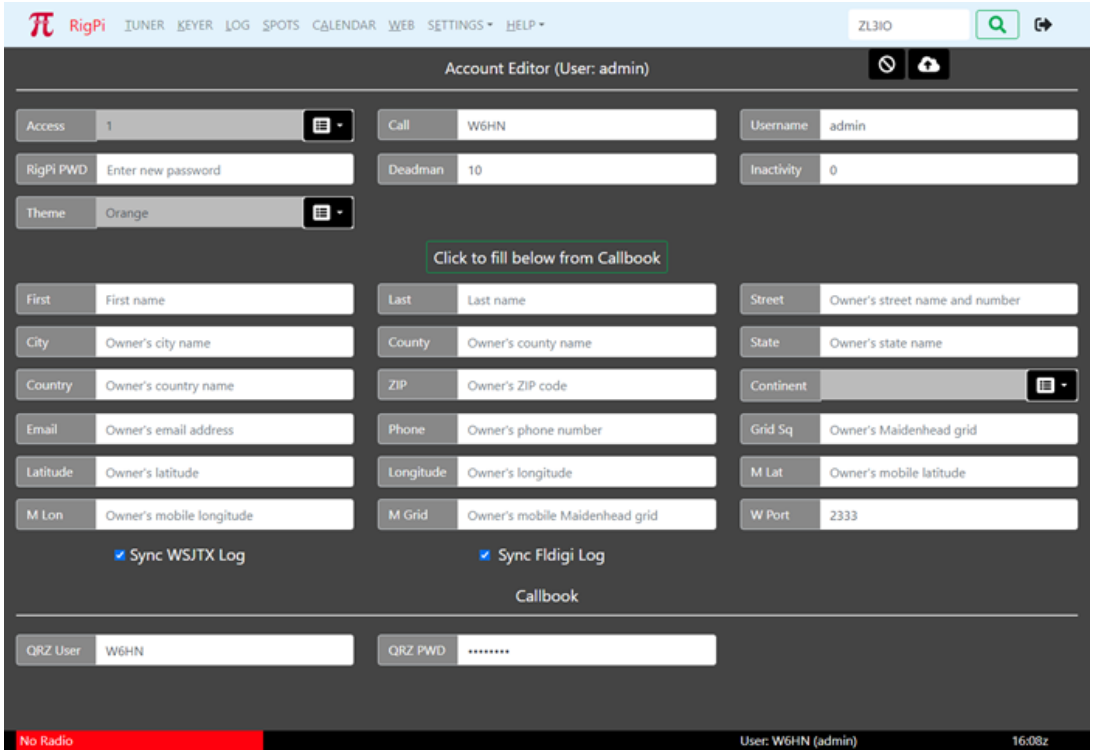
See the table below for information about each column in the Account Settings list.

Function	Name	Note
User connected	On	Y if that user is connected, otherwise N
Callsign	Call	Call for the account user
Access Security	Access	1-5, and 10. 1 = Admin account with full privileges, 2 or higher = Guest account with no access to settings. Level 4 is a guest account with no Transmit capabilities. Level 10 is a PTT-only account.
Account Username	Username	Username for that account
First name	First	First name for user
Last name	Last	Last name for user
User location	QTH	Location of user
Last time on	Last Visit	Date and time the account last accessed

4.1.1 Account Editor

The Account Settings window shows a list of all RSS accounts. When you start RSS the first time, a single account named admin with callsign ADMIN is the only account in the User list. Open the Account window from the SETTING Menu.

Personalizing the ADMIN Account



The ADMIN account cannot be deleted, but it can be reassigned. You must edit the ADMIN account to make it your own. Click the green Edit button on the right end of the ADMIN line to open the Account Editor. Three fields are critical and should be changed: Call, Username, and password.

Call — Enter your callsign, replacing ADMIN. Your own call must be entered to connect to spot clusters.

Username — Use any Username you wish. Usernames must be unique and are used to identify accounts. The Username is not case sensitive and there are no length restrictions except it must be at least one character.

This Username is used when logging in to RigPi, both in the 'normal' RigPi mode (http://rigpi4.local) and RigPi Lite mode (http://rigpi4.local/lite).

RigPi PWD — Passwords are optional. If you will be opening RSS to the Internet to operate remote, a password is essential. The password for ADMIN is blank so you can easily sign in the first time without a password.

Once you enter a password you will be required to use that (or a modified) password from then on.

This password is used when logging in to RigPi, both in the 'normal' RigPi mode (http://rigpi.local) and RigPi Lite mode (http://rigpi.local/lite).

Other optional special fields:

Access

ADMIN has an access level of 1. The first account must be an Admin account.

All RSS settings can be accessed through an account with the Access set to 1 for that account. If you have set up a level that does not provide access to settings, temporarily set that account to Admin so you can make changes.

If the Access is set to 2, the account does not have access to Account or System settings.

Access 3 blocks all settings.

Access 4 prevents the account from transmitting.

Access 10 provides only a PTT button.

A guest account can be set up with any Access level from 1 to 10.

When you save the account info, if you have changed the access level, RigPi asks if you want to reboot. It is important to proceed with the reboot.

Latitude/Longitude

Callsign lookup uses your latitude and longitude to compute the distance to a DX station. Longitudes west of 0 are negative numbers. Latitudes south of the Equator are negative numbers.

Sync WSJTX Log

Contacts logged in WSJT-X are automatically transferred to the selected log for this account. See the WSJT-X Help topic for details.

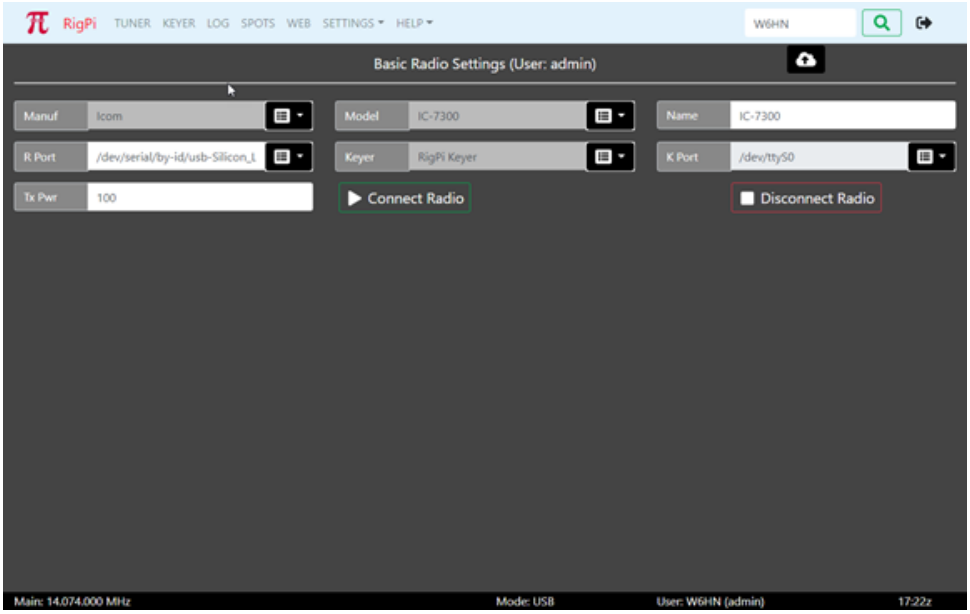
Sync Fldigi Log	Contacts logged in Fldigi are automatically transferred to the selected log for this account. See the Fldigi Help topic for details.
Deadman	Limits transmit time to the number of minutes entered in the text box. This prevents unwanted transmitting if remote control is lost while in transmit. Set Deadman to 0 to override this function. If transmit is blocked, reconnect the radio to reset the Deadman timer.
Inactivity	Number of seconds for radio inactivity before automatically closing RigPi. Enter 0 to bypass this function. If you are using a mobile device that takes over the screen with another app (such as VNC), set the Inactivity value to 0.
Theme	Select the Theme for the Tuner window. Four themes are provided: Orange, Night, LCD, and High Contrast. Note: since this box can only be filled from the drop down list it has a gray background.
QRZ User	If you wish to use the QRZ XML subscription service to look up calls, you must enter your QRZ username and QRZ password. QRZ XML is a subscription service. If you do not have a QRZ account, RSS uses the FCC database in RSS to look up info for US callsigns, and an RSS entity database to find information about non-US callsigns.
QRZ Password	Password for QRZ XML service.

The remainder of the Account fields are self-explanatory and are optional.

Click the cancel (Stop icon) to reset any changes you have made. Click save (cloud up-arrow button) to save the changes.

4.2 Basic Radio

Two Radio Settings options are provided in the RigPi SETTINGS Menu. Basic Radio settings take advantage of the Hamlib default settings for each radio. If you have made changes to the radio default Baud rate, stop bits, or RTS/DTR settings in your setup, use Advanced Radio settings. Advanced Radio settings also provide additional troubleshooting aids.



Most settings options use a drop-down list of options. Click the down arrow on the right end of an option that uses a list from which to choose. Click the option you wish to set and that option appears in the settings box. Boxes that are filled from drop down lists are gray since they cannot be filled manually.

To save changes, click the cloud up arrow at the top of the window. Use Disconnect Radio followed by Connect Radio to apply changes. Connect Radio also saves changes before applying them.

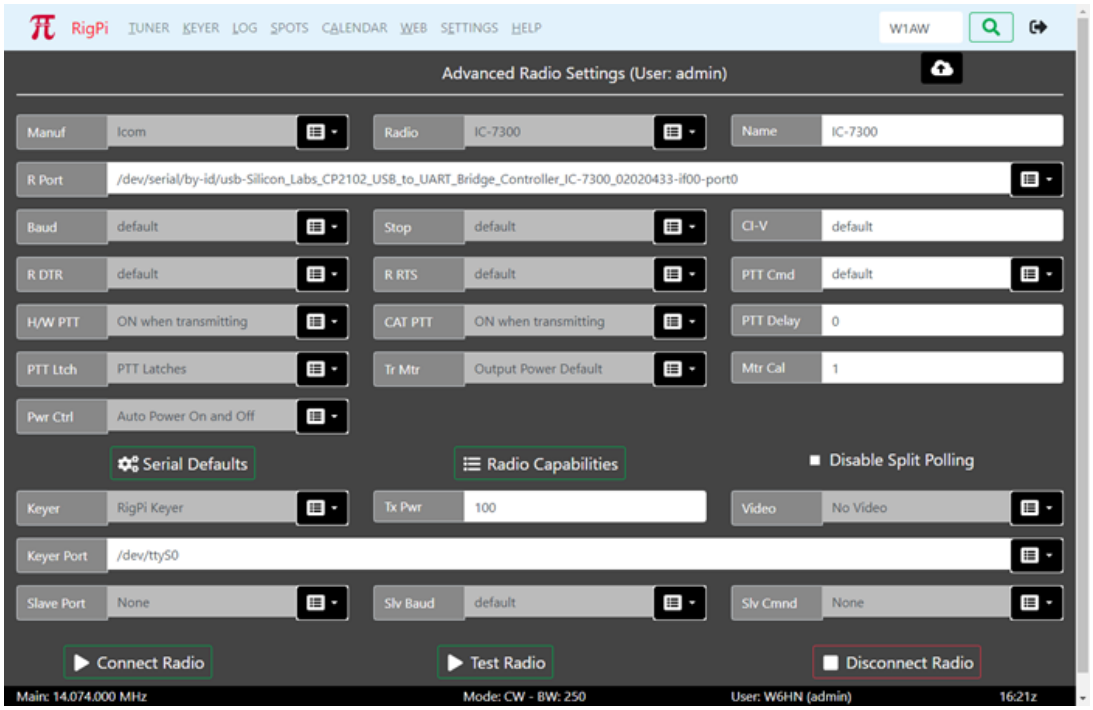
Function	Label	Notes
Radio Manufacturer	Manuf	Select the company that manufactured your radio. A special "Hamlib" manufacturer can be used for special purposes, see the Technical>Sharing Radios, Rotors and Keyers topic.
Radio Model	Radio	Once you have selected a Manufacturer, the Model list shows all supported models from that manufacturer.
Radio Name	Name	Enter the name you want to use for this radio. This radio name appears in the Tuner window, in many alert dialogs, and in your log. The Model name is added to the Name box automatically, but you can change it. For example, the model MARK-V FT-1000MP appears in the Yaesu list. You can change the Radio Name to MV 1000MP, to shorten the name.

Function	Label	Notes
Radio Port	R Port	The Port drop-down list shows all active ports connected to serial devices through a USB port. If you have a single radio connected to RigPi, there will be one long and one short entry in the list. With more than one radio or serial device, pull the radio USB connector out, refresh the page, and see what port is missing. Rebooting RSS can cause the short port names to change. so use the equivalent long name which does not change. The short ttyUSB ports are listed along with long names. The long 'by-id' name for all serial ports is included as shown in the screen shot for Advanced Radio, above. The port can be directed to another RigPi which is controlling the radio. See Radio Advanced Settings.
CW Keyer	Keyer	Select RigPi Keyer, via CAT, WinKeyer, External CTS, or None from the drop-down list. RigPi Keyer is available for one account but can be shared. Other accounts can share an assigned RigPi Keyer, or choose one of the other options. The WinKeyer option is used for a standalone K1EL WinKeyer connected through a USB port. See the Keyer Settings topic for more information about Rig, Pi Keyer and WinKeyer.
K(eyer) Port	CW Port	RigPi Keyer uses /dev/ttyS0 for control. Via CAT does not require a separate port, it uses the radio port. WinKeyer and CTS External require a separate USB port. The CW Port can be redirected to another RigPi, see Radio Advanced Settings.
Transmitter Power	TX Pwr	The default power level used by your transmitter. This value is used in logging.
Connect Radio	Connect Radio	Connect the defined radio and keyer to RigPi. The Connect Radio button also saves any changes you have made in settings. If you change to another radio or different settings, Connect Radio disconnects the current radio and connects the specified radio.

Function	Label	Notes
Disconnect Radio	Disconnect Radio	Disconnects the defined radio and keyer.

4.3 Advanced Radio

Two Radio Settings options are provided in the RigPi SETTINGS Menu. Basic Radio settings take advantage of Hamlib default settings for each radio. If you have made changes to the radio default Baud rate, stop bits, or RTS/DTR settings in your setup, use Advanced Radio settings. Advanced Radio settings also provide additional troubleshooting aids.



Most settings options use a drop-down list of options. Click the down arrow on the right end of an option that uses a list from which to choose. Click the option you wish to set and that option appears in the settings box. Boxes that are filled from drop down lists are gray since they cannot be filled manually.

To save changes, click the cloud up arrow at the top of the window. Use Disconnect Radio followed by Connect Radio to apply changes. Connect Radio also saves changes before applying them.

Function	Label	Notes
Radio Manufacturer	Manual	Select the company that manufactured your radio. A special "Hamlib" manufacturer can be used for special purposes, see the Technical>Sharing Radios, Rotors and Keyer topic.
Radio Model	Radio	Once you have selected a Manufacturer, the Model list shows all supported models from that manufacturer.
Radio Name	Name	Enter the name you want to use for this radio. This radio name appears in the Tuner window, in many alert dialogs, and in your log. The Model name is added to the Name box automatically, but you can change it. For example, the model KX3 appears in the Elecraft list. You can change the Radio Name to something like 'KX3@home' or 'KX3@remote', depending on your use. If the name is too long it will overflow the allowed space in the Tuner panel, so you may have to abbreviate it. If the account is for remote access, use 'Hamlib/Net rigctl for the radio. Change the Name to the exact name for the station RigPi radio. Doing so lets the remote RigPi know what physical radio is being used so it can looks up info such as available bandpasses.
Radio Port	R Port	The Port drop-down list shows all active ports connected to serial devices through a USB port. If you have a single USB device connected to RigPi, there will be one long and one short entry in the list. With more than one radio or serial device, pull the radio USB connector out, refresh the page, and see what port is missing. Rebooting RSS can cause the port numbers to change. Short tty USB ports are listed along with long port names provided by the USB device driver (by-id). The 'by-id' names do not change when you reboot, so choose a by-id device if possible. In addition to a USB port, RigPi can connect to another RigPi. located on the same LAN or at a distant location over the Internet. See this reference. 60
Radio Port Baud Rate	Baud	The Baud rate for the selected radio. Hamlib defaults to the highest Baud rate permitted by the radio. You can change the radio Baud rate in the radio menu. Leave the

Function	Label	Notes
		RSS Baud rate set to default if you are using the fastest Baud rate possible in your radio. (Not used for Hamlib/Net rigctl Remote connection.)
Radio Port Stop Bits	Stop	The stop bits for the selected radio. Leave this set to default if you have not changed the stop bits from the factory settings.
Icom CI-V number	CI-V	Icom radios are identified by a number unique to each radio. To use the Hamlib CI-V default number, enter default. You can use a hex number in the format 0xnn where nan is the hex identifier, or in decimal format nan. Decimal radio 23 would simply show the number 23. This identifier number only changes if you modify it from the radio's menu.
Radio Port DTR	R DTR	Determines the DTR state of the radio port. The options are: default, high, and low. To use the Hamlib default for the radio, select default.
Radio Port RTS	R RTS	Determines the RTS state of the radio port. The options are: default, high, and low. To use the Hamlib default for the radio, select default. (Not used for Remote connection.)
CAT PTT Command	PTT Cmdr	Select the CAT command to be sent to the radio for PTT On. The options are: default, w TX1;, and Custom. Some radios require TX1; to be sent to tell the radio to use the rear panel Data connector for audio input. If your radio requires a special command, use the Custom option to enter a Hamlib or custom radio command. Custom radio commands use the native CAT PTT command. Precede the command with a w<space>.
Hardware PTT	H/W PTT	Determines how the hardware PTT circuits respond. The options are: None, ON when transmitting (default),Hamlib GPIO, and ON when radio connected. This option controls both Audio PTT and Keyer PTT outputs. See the Keyer Settings topic for more control over Keyer PTT operation. The Hamlib GPIO option is designed for external

Function	Label	Notes
		programs, such as WSJT-X, that do not support GPIO pin control for PTT, and radios that do not support CAT PTT. With this option the RigPi hardware PTT switch can be used to control PTT through an ACCT connector on the radio. RigPi CAT PTT is not available when Hamlib GPIO is selected so the CAT PTT selection is ignored.
CAT PTT	CAT PTT	Determines how the CAT PTT responds. The options are: None, ON when transmitting (default), and ON when radio connected. The CAT PTT selection is ignored when you use the Hardware PTT GPIO option.
PTT Delay	PTT Delay	Enter the number of milliseconds delay from when the PTT button is toggled on the Tuner window to when transmit is started. The USB AF Gain is reduced when the PTT button is pressed to stop audio, This delay prevents the transmission of receive audio fed back from the remote device but also delays a voice transmission. The noise burst usually requires a delay of 100-200 ms. Not all audio interfaces allow audio to be muted, check using Alsamixer which shows the available settings. The RigPi Audio Board is supported. To test, open Mumble->Configure->Settings->Audio Input and set Transmit to Voice Activity. The Transmission bar graph shows input audio level. In RigPi->Settings->Advanced Radio, set PTT Delay to 3000 (3 seconds). While watching the Mumble bar graph, click PTT on RigPi. The bar graph will go down immediately followed by Transmit in 3 seconds. Be sure to set PTT Delay band to it normal value after running this test.
PTT Latch	PTT Latches	PTT mode selections include 'PTT Latches' (tap PTT button to turn transmit on continuously) and PTT Momentary (press PTT button to transmit).
Transmit Meter	Tr Mtr	Select the parameter you want displayed by the Tuner S-Meter when in transmit. The options include Output Power, Output Power Default, SWR, ALC, Voltage, Current, Mic Gain, and Meter. The readings supported by Hamlib

Function	Label	Notes
		with your radio can be found in the capabilities list shown when you click Radio Capabilities. Look in the Get Level list. None, one, or all options may be supported. Output Power Default shows the static setting for maximum power output set in your radio. See Mtr Cal, below, for calibrating the meter.
Meter Calibration	Mtr Cal	The value reported by the radio for the reading you have chosen can be calibrated with this option. If your transmitter has a maximum power output of 100 watts, you have selected Output Power Default, setting the Mtr Cal to 100 gives a full scale indication of 100. If you have set the maximum power output to 50 watts, setting Mtr Cal to 500 gives a reading of 10 on the meter. See below. Each Tr Mtr selection has its own calibration level.
Power Control	Pwr Ctrl	RigPi can turn the radio on when it first connects and off when it disconnects. The Power Control drop-down provides options for Power On and Power Off. Use Manual if you don't want RigPi to control power. The Manual option should be used when connecting to a RigPi using Hamlib Net rigctl or another copy of the same radio if you don't want that second connection to control power..
Serial Defaults button	Serial Defaults	Click to show the defaults used in Hamlib for connecting to the specified radio.
Radio Capabilities button	Radio Capabilities	Provides a list of all set and read capabilities for the selected radio.
Disable Split Polling check box	Disable Split Polling	Some radios, such as many made by Icom, do not provide a way to directly read the split VFO frequency. Instead, the frequency is read by swapping VFO's. This causes flickering on the split frequency readout. While the flickering doesn't cause changes in frequency, it can be disconcerting. Put a check in the Disable Split Polling option to prevent the reading of the split frequency VFO to stop the flickering. Keep in mind that any manual changes to the split

Function	Label	Notes
		frequency made on the radio will not known by RigPi. Split reading for some radios is not supported by Hamlib even though the radio provides a means of doing so. Use Radio Capabilities to determine if your radio fits into this category.
Morse Keyer	Keyer	Select RigPi Keyer, via CAT, WinKeyer, CTS External, or None from the drop-down list. RigPi Keyer is available for one account. (The K1EL RigPi Keyer provides two-radio support, SO2R). Other accounts can choose one of the other options. The WinKeyer option is used for a standalone K1EL WinKeyer connected through a USB port. See the Keyer Settings 121 topic for more information about RigPi Keyer and WinKeyer.
Transmitter Power	Tx Pwr	The default power level used by your transmitter. This value is used in logging.
Video Position Selection	Video	One camera is supported by RigPi, but each account has access to the video from that camera. The options include None (no video), Video -> S-meter (video replaces S-meter panel), Video -> Frequency Panel (video replaces Frequency panel). See the Motion 175 topic in Other Programs to learn more about using video with RigPi.
CW Keyer Port	Keyer Port	RigPi Keyer uses /dev/ttyS0 for control. Enter the IP of another RigPi to connect to the second Keyer board. Via CAT does not require a separate port, it uses the radio port. The CW Port parameters are not adjustable. The WinKeyer3 IC and WinKeyer devices use 1200 Baud with one stop bit. If using element keying from RigPi Hub, set the port to 30039 + n where n is the account number. For example, set the Keyer port to 30040 for account 1.
Slave Port	Slave Port	Port used for slave connection. See text below for more information on the slave command. Note the port used disappears from the port list once you have connected, it still exists for the driver. To restore the list, pull out the FTDI cable and reinsert. Refresh the Advanced Settings window.

Function	Label	Notes
Slave Baud	Slv Baud	Baud rate used for slave connections.
Slave Command	Slv Cmnd	Command format sent by RigPi when there is a frequency change. The *Kenwood IF* command sends 38 characters including current frequency. The *Kenwood FA* command sends 14 characters containing only frequency. *Band BCD* is used for devices that are controlled by BCD Band data, such as the Ameritron RCS-12 Automatic Antenna Switch. A special cable is required, see below. *Macro Decimal* is used for controlling the on/off state of up to 8 devices. A special cable is required, see below.
Connect Radio button	Connect Radio	Connect the specified radio and keyer to RigPi. The Connect Radio button also saves any changes you have made in settings.
Test Radio button	Test Radio	Attempts to connect to the radio using the settings values and creates a report that is displayed. The report can give helpful information when the radio isn't connecting. To share the report, select all the text, copy, then paste it to a destination, such as an email. An comprehensive log can be found in /var/log with the name rigpi-radio.log.
Disconnect Radio button	Disconnect Radio	Disconnects the radio

Tr Mtr Example

Here is a list of the readings are supported by Hamlib for the TS-570S. This list is extracted from the Radio Capabilities button in Radio>Advanced.

PREAMP(0..0/0) ATT(0..0/0) AF(0..0/0) RF(0..0/0) SQL(0..0/0) RFPOWER(0..0/0) MICGAIN(0..0/0) KEYSPD(0..0/0) AGC(0..0/0) SLOPE_LOW(0..0/0) SLOPE_HIGH(0..0/0) STRENGTH(0..0/0)

The only two readings that appear to apply to the TS-570S in transmit are RFPOWER and MICGAIN. The best option is the "Output Power Default" selection in Radio>Advanced>Tr Mtr which is RFPOWER in the list above. That is a static reading, it reads the max level the radio is set to, not what is being transmitted. The Mtr Cal sets the max level calibration of the meter. So if you enter 200 for Mtr Cal and you have your transmitter set to 100 watts max, the bottom digit scale on the meter should be 50 when in transmit.

Slave Command

RigPi supports a single slave connection per account.

The RigPi Slave Command sends one of two CAT commands when there is a frequency change in the connected radio, BCD Band data when the radio band is changed, or manually triggered decimal commands. The commands can be used with devices, such as the SteppIR antenna controllers, a compatible power amplifier, or a Kenwood radio. For example, you may have an Icom IC-7300 as your radio, but you also have a Kenwood TS-2000. The Kenwood frequency tracks any changes in the Icom's frequency as you tune.

The Band BCD option sends Band BCD data through a special cable to tell external devices what band the radio is currently using. The special cable is an FTDI C232HM (C232HM-EDHSL-0). This cable has 10 wires that can be used for interfacing to other devices. The FTDI cable can be purchased from Mouser Electronics. The 5th line in Band BCD mode goes low when the radio is transmitting.

The Macro Decimal option is used for Macros or a row of LED indicator lights below the tuning knob. Up to 8 external devices can be controlled using a Macro command !SWn-m, where n is 1-8 and m is 0 (off) or 1 (on). Macro Decimal switch macros can be stacked, so !SW1-1!SW3-1 turns devices 1 and 3 on.

Band BCD C232HM-EDHSL-0 wiring				
Wire	**Signal**	**Ameritron RCS-12**	**Elecraft KPA-500**	**Elecraft KPA-1500**
Red	VCC			
Orange	BIT/PIN 0	BCDA (pin 2)	Band 0 (pin 13)	Band 0 (pin 13)
Yellow	BIT/PIN 1	BCDB (pin 1)	Band 1 (pin 3)	Band 1 (pin 3)
Green	BIT/PIN 2	BCDC (pin 9)	Band 2 (pin 9)	Band 2 (pin 9)
Brown	BIT/PIN 3	BCDD (pin 8)	Band 3 (pin 14)	Band 3 (pin 14)
Grey	BIT/PIN 4	PTT (pin 7)	PTT (pin 10)	PTT (pin 10)
Purple	BIT/PIN 5			
White	BIT/PIN 6			
Blue	BIT/PIN 7			
Black	GND	Ground (pin 6)	Ground (pin 5)	Ground (pin 5)

Radio/Rotor/CW Ports

Use this table to determine the port numbers to use if connecting from a second RigPi to the radio RigPi. The ports in accounts 1 and 2 have been opened in the RigPi Firewall. If using account 3 or higher, you must modify the firewall.

Here is how to modify the Firewall to enable account 3:

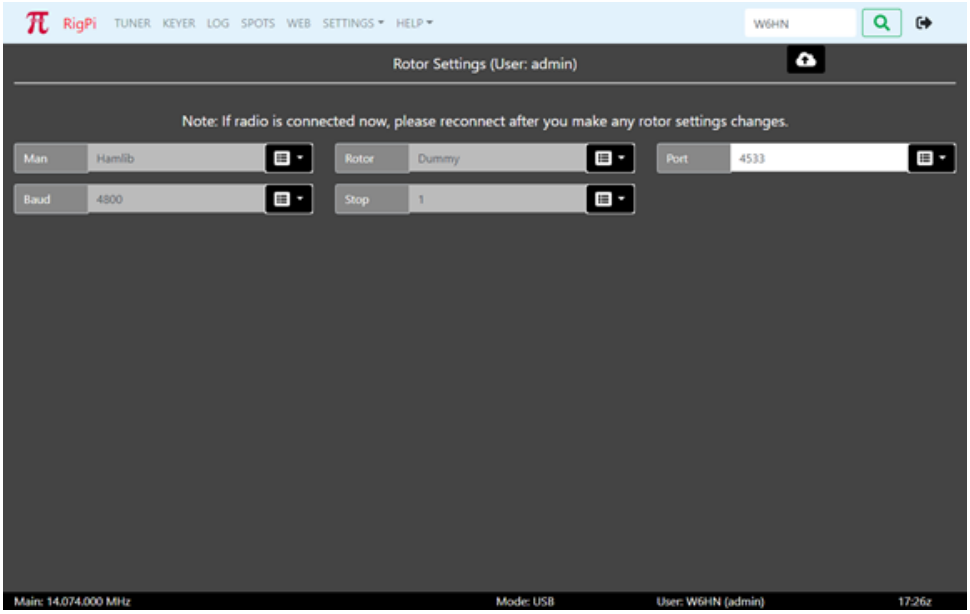
1. Open Terminal on the Raspberry Pi Desktop for the radio RigPi.
2. Enter 'sudo su'.
3. Enter 'ufw allow 4536/tcp'
4. Enter 'ufw allow 4537/tcp'
5. Enter 'ufw allow 30003/tcp'
6. Enter 'ufw allow 4536/tcp'
7. Enter 'ufw allow 40042/udp'

Account	Radio	Rotor	CW (CCM Port)	Manual CW	Notes
1	4532 tcp	4533 tcp	30001 tcp	40040 udp	
2	4534 tcp	4535 tcp	30002 tcp	40041 udp	
3	4536 tcp	4537 tcp	30003 tcp	40042 udp	Ports must be opened in Firewall
4	4538 tcp	4539 tcp	30004 tcp	40043 udp	Ports must be opened in Firewall

Open any ports you want to access in your home router. For example, open 4536 if you are using account 3 on the station RigPi and only want radio control.

4.4 Rotor

One rotor can be assigned to and controlled through each account. 30 Rotor models are supported by Hamlib from 21 manufacturers. The screen shot shows the rotor configured for the Hamlib Dummy rotor which provides a rotor simulation.



Most settings options use a drop-down list of options. Click the down arrow on the right end of an option that uses a list from which to choose. Click the option you wish to set and that option appears in the settings box. Boxes that are filled from drop down lists are gray since they cannot be filled manually.

To save changes, click the cloud up arrow at the top of the window. If you make changes to Rotor Settings while a radio is running, restart the radio in the Tuner, Radio Basic or Radio Advanced windows.

Function	Label	Notes
Rotor Manufacturer	Manuf	Select the company that manufactured your rotor. A special "Hamlib" manufacturer can be used for special purposes, see the Technical>Sharing Radios, Rotors and Keyers topic.
Rotor Model	Rotor	Once you have selected a Manufacturer, the Model list shows all supported models from that manufacturer.
Rotor Port	Port	The Port drop-down list shows all active ports connected to serial devices through a USB port. If you have a single radio connected to RigPi, there will be one entry in the list plus the rotor. With more than one serial device, pull the rotor USB connector out, refresh the page, and see what port is missing.

Function	Label	Notes
		Use the USB long name to always connect to that device. For the Hamlib Dummy rotor use the value for Rigctl Port in System Settings plus 1. For example, to use Hamlib Dummy, set the Man to Hamlib, the Rotor to Dummy, and the Port to 4533. To share a rotor, use the Rigctl Port for that radio plus 1. For example, to share a rotor assigned to radio port 4534, use port 4535 for the rotor, and Net rotctl for the Rotor. Connect to a remote RigPi by using NET Rotctl and <IP>:<port> in the port box.
Rotor Baud	Baud	Baud rate for the serial connection to the rotor.
Stop Bits	Stop	Number of Stop bits used by the rotor serial connection.

4.5 Keyer

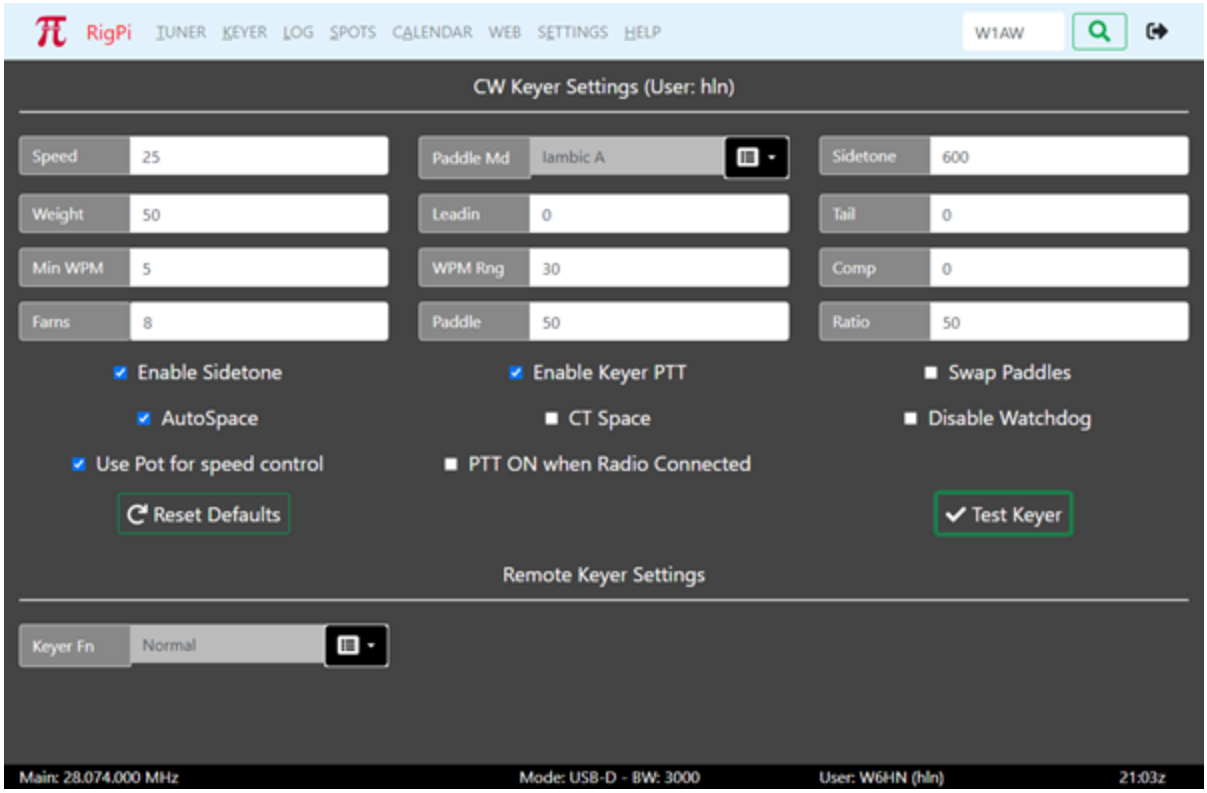
The CW Keyer Settings window is used for the RigPi Keyer, or external K1EL WinKeyer. These settings do not affect keying via CAT except for Speed. Once you have entered new settings you can test the keyer by clicking the Test Keyer button. This causes the Winkeyer to go into the host mode, leaving the command mode.

Up through RigPi 3 the Keyer board was provided by MFJ. After MFJ ceased production, K1EL designed a board for RigPi. The K1EL board is the same as the MFJ board except for several changes.

1. The K1EL Keyer supports two keyer outputs (which can be switched through a macro) with a single input. The two keyers can't be accessed at the same time, but the switching is ideal for SO2R (Single-operator, 2-radio) operations.
2. The internal speaker output can be muted through software control.
3. A Raspberry Pi fan can be controlled for temperature regulation.

The RigPi Keyer can be assigned to one account. Additional accounts can use keying via CAT or WinKeyer. There are no limits to the use of the via CAT option or to the number of external WinKeyers.

Remote Keyer provides a way to key your radio from a remote location using a paddle, bug, or straight key. RigPi CW Keyer boards are required at both ends. The Remote CW Keyer board provides speed control and sidetone. CW characters are sent by UDP data packets. Each packet contains the start or end time for a CW element. The timing is used to reconstruct the CW elements at the Radio RigPi to key your transmitter.



Most settings options use a drop-down list of options. Click the down arrow on the right end of an option that uses a list from which to choose. Click the option you wish to set and that option appears in the settings box. Boxes that are filled from drop down lists are gray since they cannot be filled manually.

RigPi Keyer and WinKeyer options

The Notes below are adapted from K1EL's WinKeyer3 IC data sheet.

Click to see WinKeyer Data Sheet

Function	Label	Notes
Keyer Speed (WPM)	Speed	
Paddle Keying Mode	Paddle Md	RigPi Keyer supports iambic A, B, Ultimatic, and Bug keying modes. In iambic mode, RigPi Keyer sends dits and dahs automatically based on which paddle you press. In bug mode RigPi Keyer sends the dits and you manually send the dahs. You also can use bug mode to operate in straight key mode or if you want to key through RigPi Keyer with a different keyer, simply set bug mode and use the dah input to key RigPi Keyer.
Keyer Sidetone (Hz)	Sidetone	The sidetone frequency is continuously adjustable between 500 and 4000Hz
Keyer Weight	Weight	A value of 50 selects no weighting adjustment. Values less than 50 reduce weighting and values greater than 50 increase weighting. Note that weighting does not affect sending speed because any increase in keyed time is subtracted from spacing time. Reduction in weighting results in a thinner sounding keying while increased weighting results in a heavier sound. Since weighting tracks speed, a given weighting will sound the same at all speeds.
Keyer PTT Lead-In Time	Leadin	RigPi Keyer provides a transmitter PTT output for each key output that can be used to switch a transmitter or linear amplifier over to transmit mode in advance of actual CW keying. You have control over the time delay between when PTT is asserted and when CW keying starts, this is lead-in. You also have control over how long the transmitter will stay in transmit after keying has stopped. The Tail setting determines the delay used for CW sent by an internal message or CW sent by RigPi. Restart the radio connect to apply any changes.
Keyer PTT Tail Time	Tail	See Keyer PTT Lead-IN Time, above

Function	Label	Notes
Speed Pot minimum WPM	Min WPM	Min WPM and WPM Range set the limits for the speed pot. Min WPM sets the lowest value returned; WPM Range indirectly specifies the maximum value returned. For example if Min WPM=10 and WPM Range=15, the full pot swing values, min to max, would be 10 to 25 WPM. Note that the max value is Min WPM+WPM Range.
Speed Pot WPM range	WPM Rng	See Min WPM, above
Keyer Keying Compensation	Comp	Keying Compensation allows a fixed amount to be added to the length of all dits and dahs. QSK keying on modern transceivers can cause shortening of dit and dah elements which is especially noticeable at high speeds. RigPi Keyer can compensate for the shortening by adding a uniform length to each dit and dah element. The adjustments are made in one-millisecond steps and the maximum adjustment allowed is 250 m Secs. Key compensation is very similar to Weighting in that an adjustment added to a dit or dah is then subtracted from the spacing between them so the overall speed is not changed. The difference between weighting and compensation is that compensation is independent of speed, so if 10 m sec of key compensation is selected, 10 m sec will be always be added regardless of speed. Be aware that at high speeds, large values of key compensation can reduce inter-element space to zero.
Slow CW Farnsworth maximum speed	Farns	Farnsworth spacing is useful for CW practice because it encourages you to learn characters by sound not individual dits and dahs. When Farnsworth is enabled, letters are sent at a fixed rate of nn WPM while spacing between characters is determined by the sending WPM rate. When the WPM rate is set above the Farnsworth WPM, Farnsworth is automatically disabled.

Function	Label	Notes
Paddle timing	Paddle	This setting controls when RigPi Keyer will start looking for a new paddle press after sensing the current one. If there is not enough delay, the keyer could send unwanted dits or dahs. If there is too much delay, the operator is held back because they can't paddle ahead. The default value is one dit time (50) and is adjustable in percent of a dit time. Faster operators report a setting somewhat less than default is optimal. If the paddle sensitivity is set to zero, dit and dah paddle memory is disabled.
Dot/Dash ratio	Ratio	Modifies the ratio of dit time to dah time. The standard ratio is 1:3 (dit:dah) when ratio = 50. The formula to determine dah/dit ratio is: DAH/DIT = 3∗(ratio/50). A value of 50 selects 1:3, a value of 33 would select 1:2, and a value of 66 would select 1:4. This causes an intentional distortion of the Morse waveform. Some ops use this option to make their CW sound less “machine like” but a little goes a long way!
Turn sidetone on/off	Enable Sidetone	Enable the RigPi Keyer sidetone for paddle and RigPi keying.
Keyer PTT mode	Enable Keyer PTT	Keyer PTT is turned on when the WinKeyer IC sends CW. To re purpose the WinKeyer IC PTT so it can set PTT independently (through programmable Macros), remove the Enable Keyer PTT check.
Left/right paddle swap	Swap Paddles	Reverse the dit/dah paddle control. Useful for left handed operation.
Keyer sending autospace	AutoSpace	Autospace works in the following way: If you pause for more than one dit time between a dit or dah, RigPi Keyer will interpret this as a letter-space and will not send the next dit or dah until the full letter-space time has been met. The normal letter-space is 3 dit spaces. RigPi Keyer has a paddle event memory so that you can enter dits or dahs during the inter-letter space and RigPi Keyer will send

Function	Label	Notes
		them as they were entered. With a little practice, autospace will help you to send near perfect Morse.
Contest spacing	CT Space	Shortens the time between characters by one dit space.
Control Keyer Watchdog	Disable Watchdog	RigPi Keyer has a paddle watchdog counter that disables the key output after 128 consecutive dits or dahs. RigPi Keyer assumes that this is an unintended condition and keying outputs are turned off. Sidetone remains on to alert the user. Paddle watchdog is on by default but it can be turned off by setting this mode bit.
Speed Control source	Use Pot for speed control	When checked, use the speed pot on the Winkeyer for speed control. When not checked, use the speed slider for speed control.
Use PTT for other applications	PTT ON when Radio Connected	Forces PTT to turn on when a radio is connected and under control. This is useful for antenna bypass switches and similar applications. Restart radio connection to apply any changes. See below.
Reset Defaults	Reset Defaults	Restores the original RigPi Keyer default values.
Test Keyer	Test Keyer	Sends two 'V' characters.
Remote Keyer Function	Keyer Fn	Selects Keyer mode. Options are Normal, Radio Keyer, Remote Keyer and External CTS. Normal: Keyer as defined in Advanced Settings 116. Radio Keyer: With two RigPi's for remote operation, select Radio Keyer for the RigPi controlling your radio. Remote Keyer: With two RigPi's for remote operation, select Remote Keyer for the RigPi at the remote location

Function	Label	Notes
		External CTS: When using a USB-to-serial adapter for keying the radio.
Remote Keyer Port	Port	When using 'Normal' mode, enter the Port (30001) and IP of a RigPi whose Keyer you want to use. If you entered the port as '/dev/ttyS0' in Advanced Settings, both RigPi Keyer sidetones are operational. For Manual (element) keying enter the UDP port used by the Radio RigPi to listen for a connection from Remote Keyer. The default port is 30040. The Remote Keyer option also provides a setting for the Radio Keyer IP.
Remote Keyer Radio RigPi IP	IP	The IP for the Radio RigPi when using Remote Keyer. This setting only appears for the Remote Keyer RigPi.
Invert Remote Keying	Invert Keying	Inverts the keying when using direct keying using a GPIO pin to send CW.

Keyer PTT

RSS has “Normal PTT” and “Keyer PTT.” Normal PTT is what you expect when you tap PTT on the Tuner window, push-to-talk. Keyer PTT, which originates on the Keyer board, can be used for other purposes.

Normal PTT from the Tuner PTT or macro switches does two things. It sends the CAT PTT command, if enabled, to the radio and simultaneously controls the hardware switches on the Keyer and Audio boards, if H/W PTT is enabled. The Keyer PTT switch goes from tip to sleeve (grounded) on the Keyer PTT connector while on the Audio board it goes from ring to sleeve (not grounded).

There is an alternate way to control Keyer PTT on the Keyer board. This alternate PTT is controlled by the K1EL WinKeyer3 IC. When PTT is “enabled” in Keyer settings, this PTT operates whenever there is outgoing CW. You can set the lead-in delay and tail delay to take care of amplifier switching in Keyer Settings. When PTT is “disabled” in Keyer settings by removing the check in the Enable Keyer PTT check box, you can control the WinKeyer3 IC PTT

through software. This latter control can be is used by a macro and by the "PTT ON when radio connected" option in Keyer settings.

Keyer PTT and RigPi PTT always engage the PTT on the Keyer board. Since RSS doesn't know when the CW Keyer is sending CW, the "Enable Keyer PTT" option is the only way to control the radio or amplifier if switching is necessary. If that switching isn't necessary, The "disabled--no check" Keyer PTT can be used for other purposes.

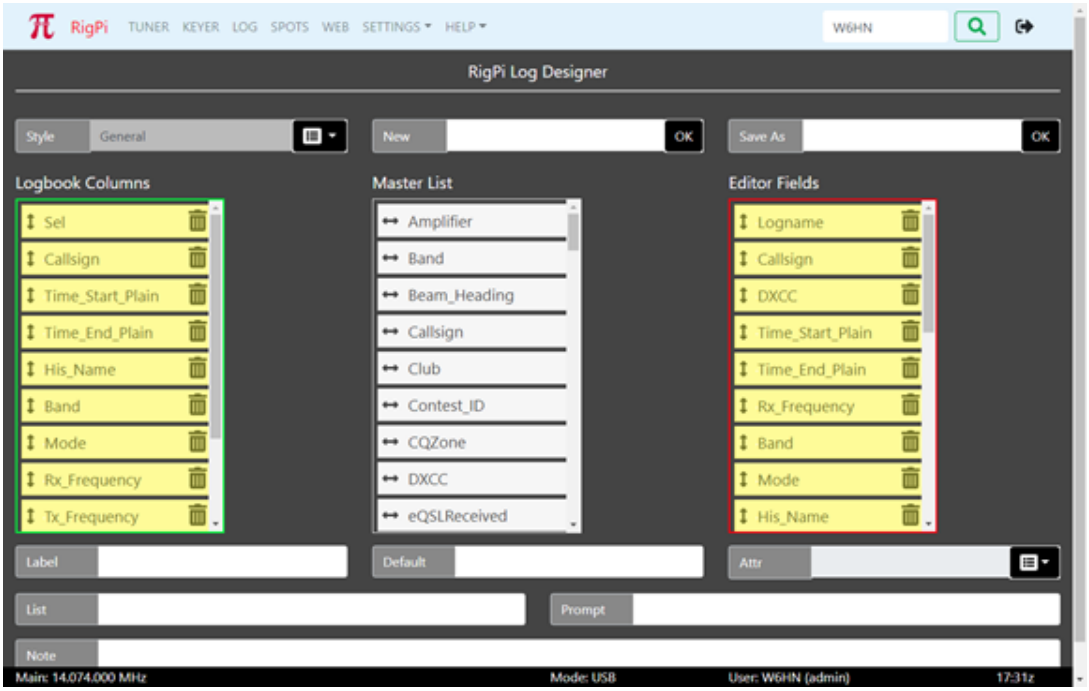
Remote Keyer Connections

If using a RigPi Keyer board, a paddle, bug or straight key is connected to Remote Keyer through the PADDLE connector. If using a bug or straight key, the Remote Keyer Paddle Mode (Paddle Md) must be changed to Vibrobug. The tip of the PADDLE connector is shorted to ground to key Remote Keyer which is then sent to the Radio RigPi.

See RigPi Remote Keyer 214 for more details.

4.6 Log Designer

The Log Designer provides a drag-and-drop way to modify existing log styles, or to design new ones. A log style is assigned to each log, but you can change the assigned style by making a selection through a drop-down list in the RSS Log window.



The top three boxes include one to select a style you wish to edit, a second to start a new style, and a third to save a style with a different name. If you add a new style, or save as an existing

style, press Enter to save or click OK. Boxes that are filled from drop down lists are gray since they cannot be filled manually.

The three lists include a master list of log fields (white, center), fields assigned to the current style for the log (yellow, left) and finally a list to show the fields assigned to the log editor (yellow, right). Items in the yellow lists can be dragged up or down to change their order, or removed from that list by deleting. Items in the master list can be dragged and inserted into either yellow list.

The fields at the bottom are for labeling and setting defaults for the selected field.

Function	Label	Notes
Field Label	Label	Appears in the column headers for the Log, and at the left end of the field for the Log Editor.
Optional default for the selected field	Default	Add a default for this field. The default is always added to the field where it can be edited.
Field attribute	Attr	The Field Attribute determines how the field is used. See below.
List of options for drop-down lists	List	Determines a default list for a list field, such as for Mode. See below.
Field prompt	Prompt	Appears in each field as a place holder unless there is a default.
Field notes	Note	Description of the field

Field Attribute

Each filed is assigned an attribute depending on how the list is used.

Attribute	How it appears	Note
None	Field has label and text box	No attributes assigned to this field.
Set Time	Field has clock icon on the right, click to set the current time	Click the clock icon to enter the current time into the field. The time may be edited.
Drop-Down List	Drop-down list, click list icon on left	Contents of drop-down list. Use the List field to enter a comma-delimited list. For example, CW,PHONE,DIGITAL for modes. If a Drop-down list is not defined for modes, all modes will be in the list.
No Edit	Field is disabled	Do not allow editing of this field. Used for record numbers or for any field that should not be changed.
Caps	Field converted to capital letters	Use for callsign fields or any field that should be in upper case.
Add periods	Adds two periods to frequencies	10 meter CW example: 28.027.123

4.7 Spots

The Spots function connects to a Telnet spot cluster using your callsign. Enter your callsign in SETTINGS>Accounts>Account Editor.

Spot Settings list contains an extensive list of known DX Cluster Telnet sites. Click a site to use it as a source for spots in the Spots window. Retain Time is the number of minutes before spots are deleted from the Spots window list.

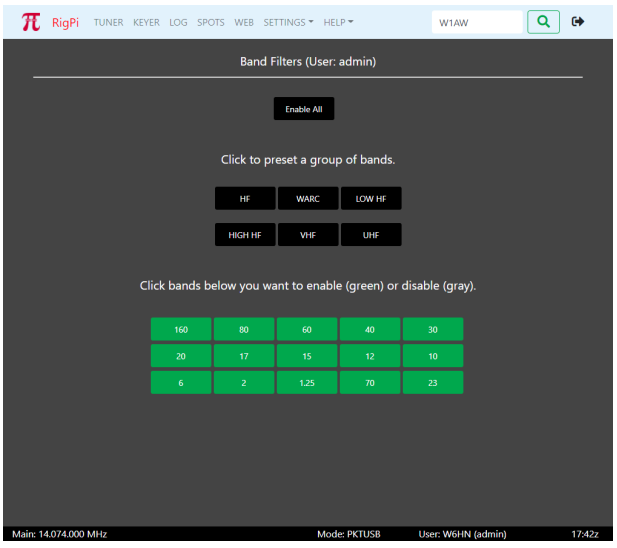
If you wish to use a site close to your location, the Spot Site Filter (Funnel) has selections for All Clusters, Closest to Me, and My US State. Closest to me uses the Grid Square value entered for the current account in Account Settings. The US two-letter abbreviation is also taken from Account Settings.

1. 

Notes:

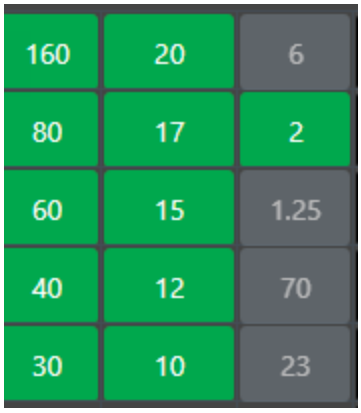
2. Spot clusters are not shown that 1) do not list a port number or 2) include a reference to CW Skimmer spots.
3. Filter "Closest to me" uses the first two characters of the Grid Sq entered in Account settings for the current account.
4. Filter "My US State" uses the 2-character state entered in Account settings for the current account.

4.8 Band Filter

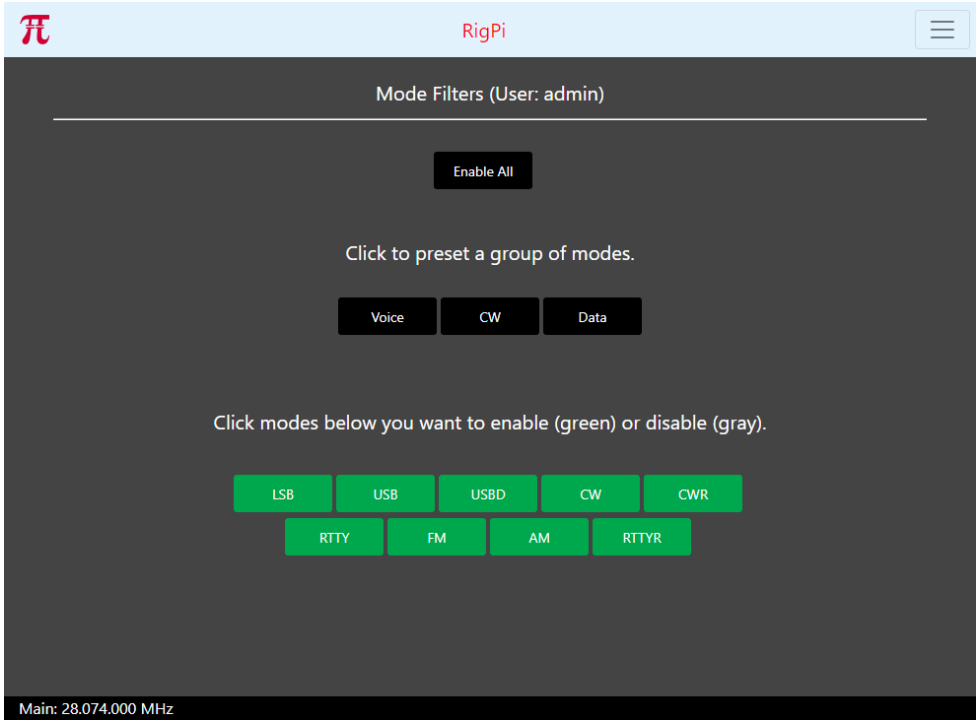


The Band Filter settings window provides a way to disable band selections in the Tuner and Keyer windows. For example, a KX3 with a 2-meter accessory board cannot operate on 6, 1.25, 70 or 23. Select the bands you don't want activated. In the Tuner and Keyer windows the disabled bands are shown with a gray background.

Click Enable All to enable all bands.

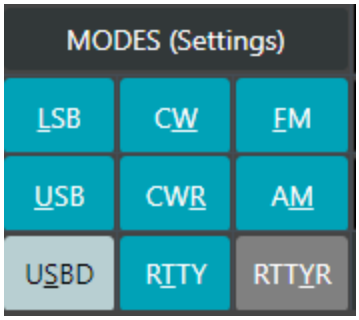


4.9 Mode Filter

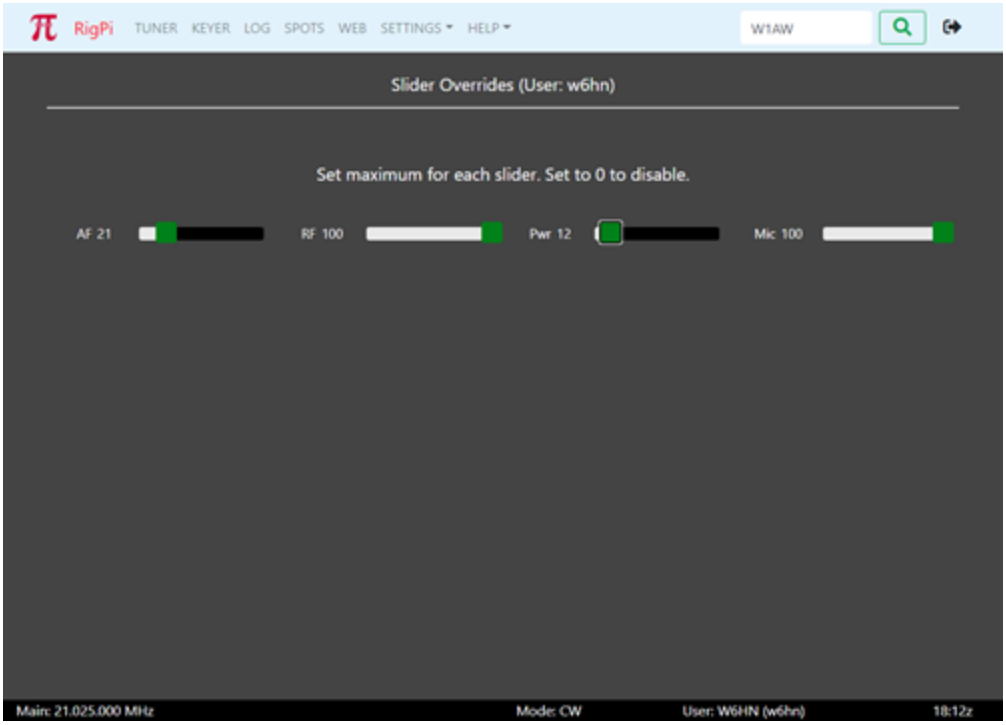


The Mode Filter settings window provides a way to disable mode selections in the Tuner and Keyer windows. For example, you may not want to use the RTTYR mode. Select the modes you don't want activated. In the Tuner and Keyer windows the disabled modes are shown with a gray background.

Click Enable All to enable all modes.



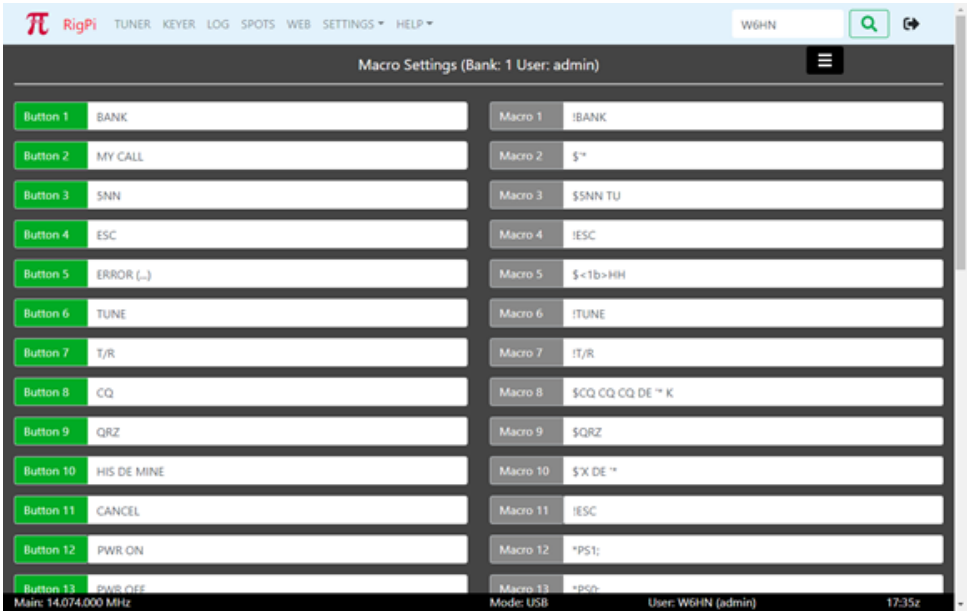
4.10 Slider Overrides



Depending on the capabilities of your radio, up to four sliders are shown on the Tuner window. The Slider Override settings can be used to set the maximum level for each slider, or disable one or more completely. The settings above indicate that the AF Gain can be set to a maximum of 21% and the Pwr output can be set to 12 watts maximum.

Set a slider to 0 to disable it. Set the slider to 100 to provide the full range.

4.11 Macros



RSS provides 128 programmable macro keys in 4 banks of 32 each. The keys are available in the Tuner and CW Keyer windows. Each macro has a space to enter a button caption and a command. The total length of all macros is 2000 characters per bank per account. Macros can be used in a number of ways:

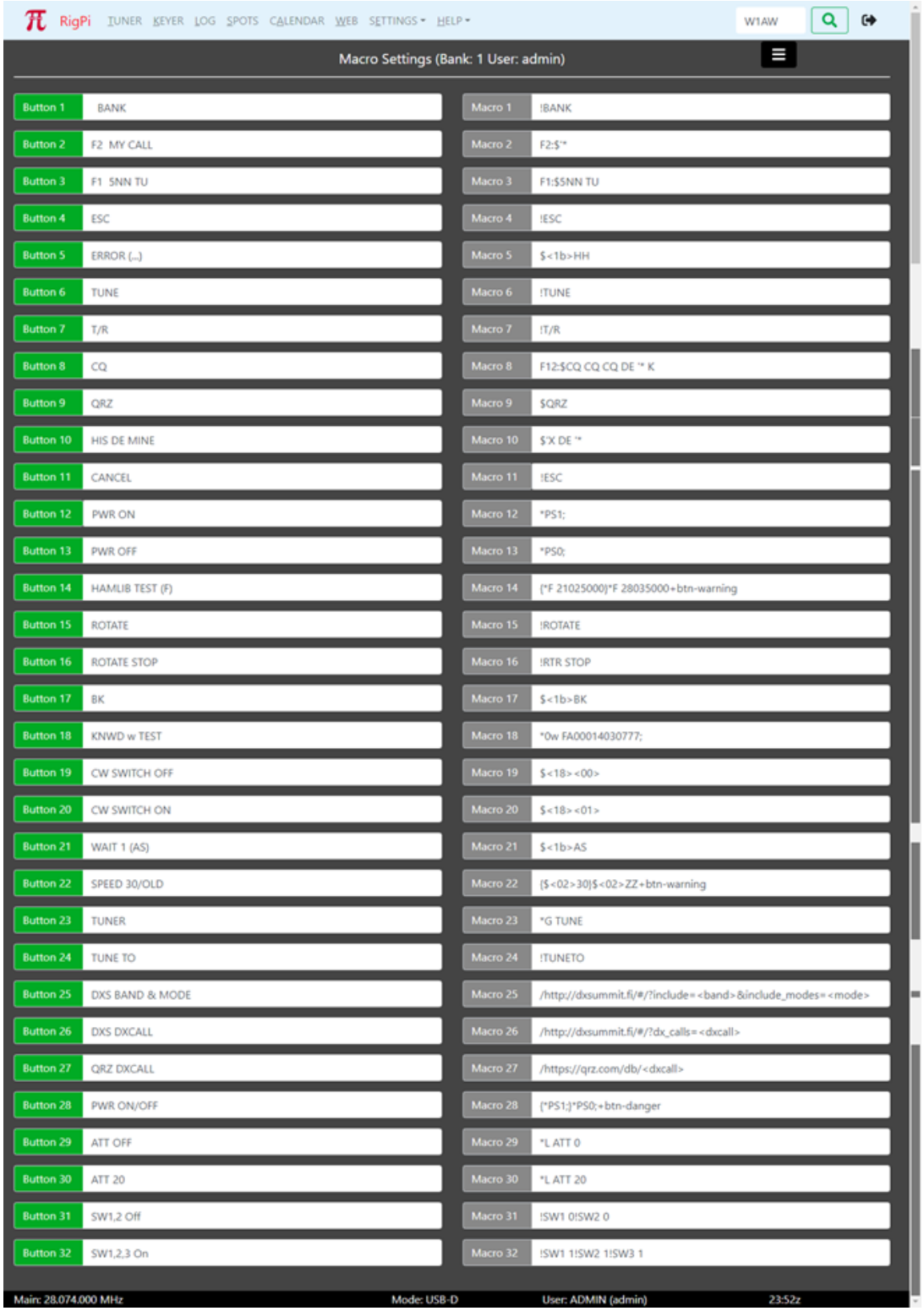
- CW messages
- Hamlib Commands
- Direct radio commands
- Open web pages
- Special commands

Macro Save/Restore

Each bank of macros can be saved and restored. Use the "hamburger" icon button (upper right) to save the current macro bank to the downloads folder or to restore a saved macro bank. The downloads folder is determined by the device or computer you are using to connect to RigPi. If you are using a desktop PC to connect to RigPi, macro banks are sent to the downloads folder on the PC. Select the Restore button to display a file explorer window to find the macro bank file you want to restore.

Macro banks are downloaded as text (.txt) files. You can modify macros in the .txt file using any text editor. The edited macro text file can then be uploaded to replace the current set.

The last-used Macro Bank in the Tuner and Keyer windows are restored when you reopen either window.



CW Messages

CW Messages start with a $ character. The message can consist of ASCII printable characters, special control characters, or a combination of both. RigPi Keyer and External WinKeyer share the same control characters. The control characters are defined in the WinKeyer3 data sheet.

Click to see WinKeyer Programming Data

For example, one WinKeyer3 control character, 1bH, is used to combine consecutive characters to create a prosign. The prosign BK is formed by the CW command $<1b>BK. This is a combined ASCII printable and control character CW message.

A printable ASCII message might be $5NN TU for the signal report plus "Thank You."

Special CW keying characters that can be used in a RigPi Keyer or WinKeyer3 macro (prefaced by $):

Character	Result
'*	Your call sign (apostrophe + asterisk)
'X	DX call
<1b>AR	AR
<1b>AA	AA
<1b>BK	BK
<1b>BT	BT
<1b>CL	CL
<1b>HH	ERROR (.....)

Character	Result
<1b>KN	KN
<1b>SK	SK
<1b>AS	AS (Wait)
<02>number	Set CW speed to 'number.' To set the speed to 30 wpm, the command is <02>30. Use a value of 0 to set the speed to the last used speed in a stacked speed macro. {<02>30}<02>20 sets the speed to 30 when a stacked speed macro starts and 20 when the second part of the stacked macro is sent. {<02>30}<02>0 sets the speed back to what it was before the macro was started.
<18><00>	Switch CW Keyer PTT off when PTT option is disabled in Keyer Settings.
<18><01>	Switch CW Keyer PTT on when PTT option is disabled in Keyer Settings.
!ESC	Stops a CW message that is being transmitted or stops the tune mode
!TUNE	Key down (tap Tune again, or use ESC or CANCEL macro to stop)
<F1>	Select K1EL Winkeyer output 1
<F2>	Select K1EL Winkeyer output 2
<03>	Enable Winkeyer Speed Pot for CW speed control
<04>	Enable RigPi slider for CW speed control

Hamlib Commands

RSS uses the Hamlib library to control radios and rotors. The library is documented online on the Hamlib developer's web site.

Click to see Hamlib Rigctl commands

The rigctld utility is used for radio commands while the rotctld is used for rotor commands. Preface rigctld and rotctld command with * (asterisk). For example, to create a macro to set the main VFO frequency to 14.222.220 MHz, use the macro *F 14222220. Note the space between the F and 1. Many commands return a value from the radio. For example, the macro *f returns the current main frequency from the radio. Return values are shown in a modal alert box. If an invalid command is used in a macro and error message is displayed.

Direct Radio Commands

A special Hamlib rigctld command, w, is used to send commands to radios when there is no rigctld native command. For example, to set the squelch on an Elecraft KX3 to 50, use the command *0w SQ050. The w command is prefaced by an asterisk and the number 0 or 1. Some radio commands elicit a response, others don't. Use 0 for commands for which the radio doesn't respond and 1 if a response is expected. The command shown in the Macro screen shot sets the frequency of a Kenwood or Elecraft radio to 15 meters. *0w FA00021025000; Commands that return values from the radio show the resulting data in a modal dialog box. For example, *1w FA; returns the current main frequency from Kenwood and Elecraft radios. If an invalid command is used in a w custom command an error message is shown.

Some radios, such as Icom and many Yaesu radios, require the use of hex numbers in w commands. Use the notation \0xNN (NN=a valid hex number) for these radios. Return values will also be hex numbers and may not display in a meaningful way.

Stacking Macros

More than one macro can be inserted in a single macro slot. For example, you can add a mode macro to a frequency set macro. Hamlib and Direct Radio Commands (0w/1w) can be stacked and mixed.

To add a second or additional macros to an existing macro, simply add the command and any command prefixes. Using Hamlib commands to set frequency, mode and passband, use this format:

*F 14222220*M USB 3000

This macro sets the radio frequency to 14.222220 MHz, the Mode to USB and the passband to 30000 Hz. Here are some examples using Hamlib commands:

Command	What Happens	Note
*F 14055444*M CW 250	Tune radio to 14.055.444 CW with a passband of 250 Hz	Uses Hamlib commands
*S 1 VFOB*I 14058222	Set radio to split mode, transmit on 14058222	Uses Hamlib commands

Latching Macros

Many radio commands set a state such as on and off, or you may wish to program a button that toggles between two frequencies. RigPi Macros use a special format to determine the command for each state and the color used for a button that has been clicked.

{command1}command2+btn-color

The command in '{}' is the first command executed when the button is clicked. This starts a stacked command.

The color determines the color of the button when first clicked.

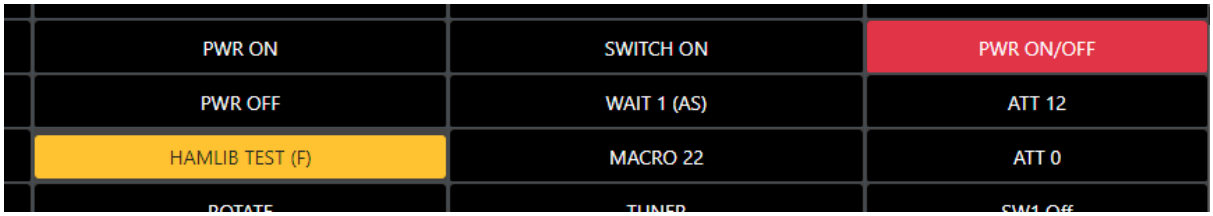
If you don't provide a color, "Info" is the default color.

Here are several samples of how to use a Latching Macro.

Note that the button labels are for your reference only and are not use by RigPi. For example, the HAMLIB TEST (F) label could be HT-F or any other label of your choosing. The Commands must be precisely as shown.

Button label	Command	Notes
PWR ON/OFF	{*PS1;}*PS0;+btn-danger	Button is red ('danger') when power is on.
HAMLIB TEST (F)	{*F 21005000*M CW 250}*F 28074000*M PKTUSB 3000+btn-	Button is yellow ('warning') when frequency is set to 21.025.000

	warning	
SPEED	{$<02>30}$<02>ZZ+btn-warning	Set the base CW speed using the Keyer window slider. The base speed replaces 'ZZ'.
Mic<>USB Icom	{*0w \0xFE\0xFE\0x94\0xE0\0x1A\0x05\0x00\0x66\0x03\0xFD}*0w \0xFE\0xFE\0x94\0xE0\0x1A\0x05\0x00\0x66\0x00\0xFD+btn-danger	Icom radios, enable front panel mic connector or rear panel USB connector for audio.
RADIO AF MUTE	{*L AF 0}*L AF XX+btn-danger	Mute audio for this radio. The active AF level replaces 'XX'.
RADIO USB MUTE	{*L USB_AF 0;}*L USB_AF YY;+btn-danger	Mute USB Audio for this radio. The active USB AF level replaces 'YY'.



Web Commands

Macros can be created to open web sites in a new browser window. Web commands start with the slash character ("/"). The DX Call, band and mode can be embedded in the command. This is useful for opening QRZ.com to the DX Call, or opening DX Summit filtering on call, band and mode. You can create your own web commands for other sites.

Button label	Command	Notes
QRZ DX CALL	/https://qrz.com/db/<dxcall>	Look up 'dxcall' on QRZ
DXS BAND & MODE	/http://dxsummit.fi/#/?include=<band>&include_modes=<mode>	Look up all spots on DX Summit for the current band and mode
DXS DXCALL	/http://dxsummit.fi/#/?dx_calls=<dxcall>	Look up all spots on DX Summit for the current DX call

Function Key Shortcuts

Assign macros to F-keys for quick access from your keyboard. Use a prefix of Fn: to assign F-key n. F2-F12 can be used. F1 is often used by browsers to open Help. For example,

F3:$5NN TU

assigns F3 to a CW macro that sends 5NN TU.

System Commands

System command macros are disabled by default since they can be a serious security risk. If you aren't careful, you can issue commands that will damage important RSS files. If you wish to experiment, uncomment the exec line in programs/systemExec.php. Be careful! **Do NOT enable this function for security reasons if your RSS is accessible from the Internet.**

Preface system commands with #. For example, to program a macro to reboot RSS, use the command #sudo reboot.

Other Special Commands

Special '!' commands that can be sent using a macro key include the following:

Command	What Happens
!BANK	Changes Macro Bank to the next higher bank. Starts over after bank 4. Current bank is shown by selected Macro Band button.
!T/R	Toggles Transmit/Receive (uses PTT Latch mode even if PTT is set for Momentary)
!ROTATE	Turn your station rotor to the DX bearing. Add a space+bearing to set to that bearing with no interaction. (Example: !ROTATE 33 sets bearing to 33 degrees.)
!RTR STOP	Stop rotor immediately
{!ROTATE 180}!RTR STOP+btn-danger	Latching macro that rotates the rotor to 180 (or any other specified bearing), tap again to stop the rotor.

Command	What Happens
!PTTON	Turns on RigPi Keyer and Audio board PTT. A radio does not have to be connected. If using this to control an external power switch, turn off hardware PTT in Advanced Radio settings>H/W PTT.
!PTTOFF	Turns off RigPi Keyer and Audio board PTT. A radio does not have to be connected. If using this to control an external power switch, turn off hardware PTT in Advanced Radio settings>H/W PTT.
!SWn	The the !SWn command, macros can control on and off to up to 8 external devices through a special cable (see below). (Use !SW0 to reset all 8 lines.)
!TUNER	Engage internal tuner in radio.
!TUNETO	A dialog allows you to set a frequency, mode and passband (bandwidth). See below.

Switching External Devices

Using the !SWn macro RigPi can control up to 8 external devices that can be turned on or off with 5-volt signals. For example, !SW1 can be used to turn on and off device 1. The macro latches the current value, so successive taps turn the device on and off. Use !SW0 to reset all eight outputs.

This function requires a special USB cable:

FTDI C232HM (C232HM-EDHSL-0). This cable has 10 wires that can be used for interfacing to other devices. The FTDI cable can be purchased from Mouser Electronics.

Wire	Signal
Red	VCC

Wire	Signal
Orange	BIT/PIN 0
Yellow	BIT/PIN 1
Green	BIT/PIN 2
Brown	BIT/PIN 3
Grey	BIT/PIN 4
Purple	BIT/PIN 5
White	BIT/PIN 6
Blue	BIT/PIN 7
Black	GND

IC-7610/IC-7300 Macros (tnx KK5VG)

Macro	***HEX COMMANDS***
IC-7610 ON	*1w \0xFE\0xFE\0x98\0xE0\0x18\0x01\0xFD
IC-7610 OFF	*1w \0xFE\0xFE\0x98\0xE0\0x18\0x00\0xFD
NOISE REDUCTION ON	*1w \0xFE\0xFE\0x98\0xE0\0x16\0x40\0x01\0xFD
NOISE REDUCTION OFF	*1w \0xFE\0xFE\0x98\0xE0\0x16\0x40\0x00\0xFD
NOISE REDUCTION LEVEL 2	*1w \0xFE\0xFE\0x98\0xE0\0x14\0x06\0x40\0xFD
NOISE REDUCTION LEVEL 6	*1w \0xFE\0xFE\0x98\0xE0\0x14\0x06\0x1\0x10\0xFD
ROTOR	
ROTOR STOP	
NOTCH ON	*1w \0xFE\0xFE\0x98\0xE0\0x016\0x41\0x01\0xFD
NOTCH OFF	*1w \0xFE\0xFE\0x98\0xE0\0x016\0x41\0x00\0xFD
COMPRESSION ON	*1w \0xFE\0xFE\0x98\0xE0\0x016\0x44\0x01\0xFD
COMPRESSION OFF	*1w \0xFE\0xFE\0x98\0xE0\0x016\0x44\0x00\0xFD
PREAMP OFF	*1w \0xFE\0xFE\0x98\0xE0\0x016\0x02\0x00\0xFD
PREAMP 10	*1w \0xFE\0xFE\0x98\0xE0\0x016\0x02\0x01\0xFD
PREAMP 20	*1w \0xFE\0xFE\0x98\0xE0\0x016\0x02\0x02\0xFD
CHANGE MAIN / SUB	*1w \0xFE\0xFE\0x98\0xE0\0x07\0xB0\0xFD

ATTENUATOR OFF	*1w \0xFE\0xFE\0x98\0xE0\0x11\0x00\0xFD
ATTENUATOR 6 DB	*1w \0xFE\0xFE\0x98\0xE0\0x11\0x06\0xFD
ATTENUATOR 12 DB	*1w \0xFE\0xFE\0x98\0xE0\0x11\0x12\0xFD
ATTENUATOR 18 DB	*1w \0xFE\0xFE\0x98\0xE0\0x11\0x18\0xFD
VFO	*1w \0xFE\0xFE\0x98\0xE0\0x07\0xFD
MEMORY	*1w \0xFE\0xFE\0x98\0xE0\0x08\0xFD
ANTENNA 1	*1w \0xFE\0xFE\0x98\0xE0\0x12\0x0000\0xFD
ANTENNA 2	*1w \0xFE\0xFE\0x98\0xE0\0x12\0x0001\0xFD
RF -30%******************	*1w \0xFE\0xFE\0x98\0xE0\0x14\0x02\0x2\0x20\0xFD (???)
RF -50%******************	*1w \0xFE\0xFE\0x98\0xE0\0x14\0x02\0x1\0x90\0xFD (???)
RF 100%******************	*1w \0xFE\0xFE\0x98\0xE0\0x14\0x02\0x2\0x55\0xFD (???)
14.300 Mhz	*F 14300000
50.525 Mhz	*F 50525000
MONITOR ON	*1w \0xFE\0xFE\0x98\0xE0\0x16\0x45\0X01\0xFD
MONITOR OFF	*1w \0xFE\0xFE\0x98\0xE0\0x16\0x45\0X00\0xFD
RESET	
NOISE BLANKER ON	*1w \0xFE\0xFE\0x98\0xE0\0x16\0x22\0x01\0xFD
NOISE BLANKER OFF	*1w \0xFE\0xFE\0x98\0xE0\0x16\0x22\0x00\0xFD
DUAL WATCH ON	*1w \0xFE\0xFE\0x98\0xE0\0x7\0xC1\0xFD
DUAL WATCH OFF	*1w \0xFE\0xFE\0x98\0xE0\0x7\0xC0\0xFD
PBT IN +150	*1w \0xFE\0xFE\0x98\0xE0\0x14\0x08\0x01\0x55\0xFD
PBT OUT -150	*1w \0xFE\0xFE\0x98\0xE0\0x14\0x08\0x1\0x00\0xFD
PBT IN .0	*1w \0xFE\0xFE\0x98\0xE0\0x14\0x07\0x01\0x30\0xFD
PBT OUT .0	*1w \0xFE\0xFE\0x98\0xE0\0x14\0x08\0x01\0x30\0xFD
COMPRESSION LEVEL 3	*1w \0xFE\0xFE\0x98\0xE0\0x14\0x0E\0X00\0x0270\0xFD
COMPRESSION LEVEL 5	*1w \0xFE\0xFE\0x98\0xE0\0x14\0x0E\0X01\0x0220\0xFD

COMPRESSION LEVEL 7	*1w \0xFE\0xFE\0x98\0xE0\0x14\0x0E\0X01\0x0265\0xFD
COMPRESSION LEVEL 10	*1w \0xFE\0xFE\0x98\0xE0\0x14\0x0E\0X02\0x055\0xFD
RF POWER 8W	*1w \0xFE\0xFE\0x98\0xE0\0x14\0x0A\0x00\0x21\0xFD
RF POWER 25W	*1w \0xFE\0xFE\0x98\0xE0\0x14\0x0A\0x00\0x65\0xFD
RF POWER 50W	*1w \0xFE\0xFE\0x98\0xE0\0x14\0x0A\0x01\0x30\0xFD
RF POWER 75W	*1w \0xFE\0xFE\0x98\0xE0\0x14\0x0A\0x01\0x93\0xFD
RF POWER 100W	*1w \0xFE\0xFE\0x98\0xE0\0x14\0x0A\0x02\0x55\0xFD
MIC GAIN 25%	*1w \0xFE\0xFE\0x98\0xE0\0x14\0x0B\0x00\0x0165\0xFD
MIC GAIN 50%	*1w \0xFE\0xFE\0x98\0xE0\0x14\0x0B\0x01\0x0230\0xFD
MIC GAIN 75%	*1w \0xFE\0xFE\0x98\0xE0\0x14\0x0B\0x01\0x0193\0xFD
MIC GAIN 100%	*1w \0xFE\0xFE\0x98\0xE0\0x14\0x0B\0x02\0x0055\0xFD
AGC SLOW	*1w \0xFE\0xFE\0x98\0xE0\0x16\0x12\0x03\0xFD
AGC MID	*1w \0xFE\0xFE\0x98\0xE0\0x16\0x12\0x02\0xFD
AGC FAST	*1w \0xFE\0xFE\0x98\0xE0\0x16\0x12\0x01\0xFD
MANUAL NOTCH - ON	*1w \0xFE\0xFE\0x98\0xE0\0x16\0x48\0x01\0xFD
MANUAL NOTCH - OFF	*1w \0xFE\0xFE\0x98\0xE0\0x16\0x48\0x00\0xFD
MANUAL NOTCH WIDTH - WID	*1w \0xFE\0xFE\0x98\0xE0\0x16\0x57\0x00\0xFD
MANUAL NOTCH WIDTH - MID	*1w \0xFE\0xFE\0x98\0xE0\0x16\0x57\0x01\0xFD
MANUAL NOTCH WIDTH - NAR	*1w \0xFE\0xFE\0x98\0xE0\0x16\0x57\0x02\0xFD

MACRO	***HAMLIB COMMANDS***
IC-7610 ON	*PS1;
IC-7610 OFF	*PS0;
NOISE REDUCTION ON	*U NR 1
NOISE REDUCTION OFF	*U NR 0

NOISE REDUCTION LEVEL 2	*L NR .2
NOISE REDUCTION LEVEL 6	*L NR .6
ROTOR	!ROTATE
ROTOR STOP	!RTR STOP
NOTCH ON	*U ANF 1
NOTCH OFF	*U ANF 0
COMPRESSION ON	*U COMP 1
COMPRESSION OFF	*U COMP 0
PREAMP OFF	*L PREAMP 0
PREAMP 10	*L PREAMP 10
PREAMP 20	*L PREAMP 20
CHANGE MAIN / SUB	
ATTENUATOR OFF	*L ATT 0
ATTENUATOR 6 DB	*L ATT 6
ATTENUATOR 12 DB	*L ATT 12
ATTENUATOR 18 DB	*L ATT 18
VFO	*V VFO
MEMORY	*V MEM
ANTENNA 1	*A 0
ANTENNA 2	*A 1
RF -30%	*L RF .26
RF -50%	*L RF .51
RF 100%	*L RF 1.0
14.300 Mhz	*F 14300000*M USB 2500
50.525 Mhz	*F 50525000*M USB 2500
MONITOR ON	*U MON 1
MONITOR OFF	*U MON 0
RESET	
RESET IS A LIST OF COMMANDS (IN ONE MACRO)	*U COMP 0*U NR 0*V VFO*ANF 0*L RF 1.0*U MON 0*A 1*L PREAMP 0*L ATT 0*Y 1*U NB 0*U DUAL_WATCH 0*L PBT_IN .50*L PBT_OUT .50*L MICGAIN .51*U MN 0*L RFPOWER 1.0*L AGC 5

THAT CLOSE THE COMMANDS
THAT I MIGHT HAVE OPENED.

NOISE BLANKER ON	*U NB 1
NOISE BLANKER OFF	*U NB 0
DUAL WATCH ON	*U DUAL_WATCH 1
DUAL WATCH OFF	*U DUAL_WATCH 0
PBT IN +150	*L PBT_IN .60
PBT OUT -150	*L PBT_OUT .60
PBT IN .0	*L PBT_IN .50
PBT OUT .0	*L PBT_OUT .50
COMPRESSION LEVEL 3	*L COMP .3
COMPRESSION LEVEL 5	*L COMP .5
COMPRESSION LEVEL 7	*L COMP .7
COMPRESSION LEVEL 10	*L COMP 1.0
RF POWER 8W	*L RFPOWER .08
RF POWER 25W	*L RFPOWER .26
RF POWER 50W	*L RFPOWER .51
RF POWER 75W	*L RFPOWER .76
RF POWER 100W	*L RFPOWER 1.0
MIC GAIN 25%	*L MICGAIN .26
MIC GAIN 50%	*L MICGAIN .51
MIC GAIN 75%	*L MICGAIN .76
MIC GAIN 100%	*L MICGAIN 1.0
AGC SLOW	*L AGC 3

AGC MID	*L AGC 5
AGC FAST	*L AGC 2
MANUAL NOTCH - ON	*U MN 1
MANUAL NOTCH - OFF	*U MN 0
MANUAL NOTCH WIDTH - WID	
MANUAL NOTCH WIDTH - MID	
MANUAL NOTCH WIDTH - NAR	

TUNE TO Macro

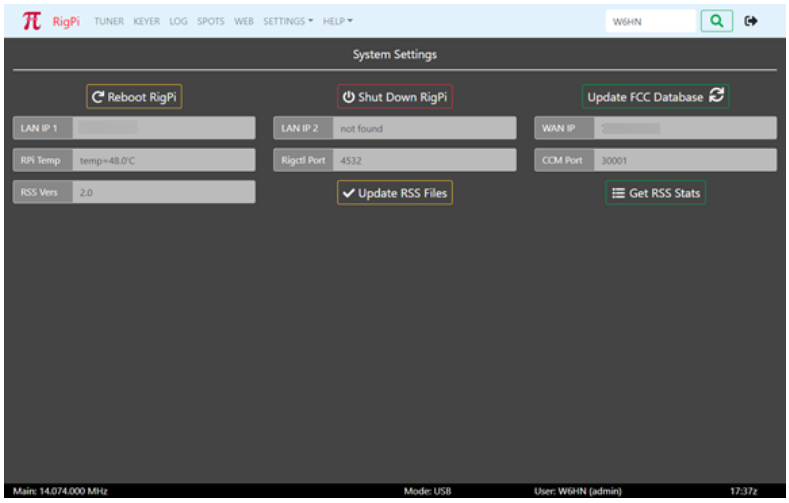
Use the TUNE TO macro to set the frequency, mode and bandwidth for your radio. When you leave that band and come back later, the frequency, mode and bandwidth you originally set are restored. Before using TUNE TO, RigPi uses the defaults for you radio, not necessarily what they were set to before starting RigPi.

Enter any valid bandwidth in the Passband box or select from the drop-down list. Some new radios provide continuous passband setting instead on Narrow, Normal and Wide. RigPi suggests bandwidths in the drop-down list, or you can enter a passband manually. Leave "Current=" and change the passband. For example, to change the passband to 3600, you will see "Current=3600" after adding 3600.

If you enter a bandwidth the radio doesn't support, RigPi reverts to the "Normal" setting.

4.12 System

System Settings provides information about system aspects of RSS and buttons to reboot RigPi or shut it down. System Settings is only available for Access Level 1 accounts.

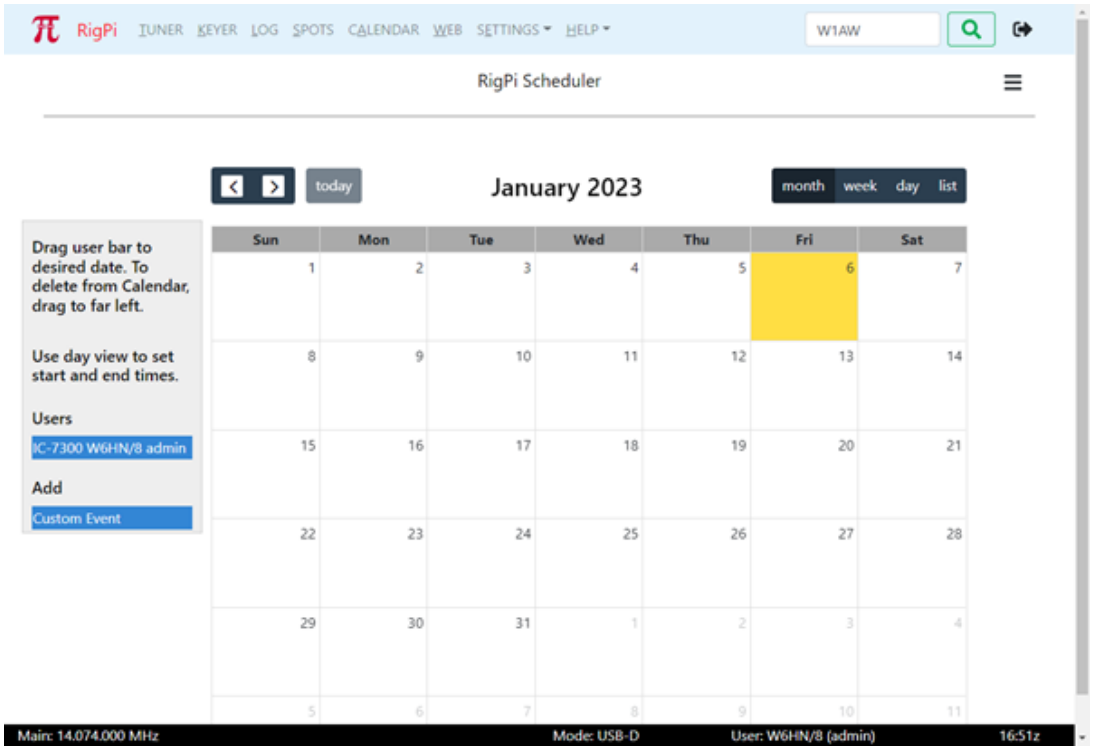


Reboot RigPi	Restarts RigPi. Any active user accounts must be restarted along with connecting radios.
Shut Down RigPi	Use the Shut Down button before disconnecting power to RigPi. Wait for the green activity light to stop blinking for proceeding. Not doing so could damage the RigPi memory card.
Get FCC Database	Refreshes the FCC callsign lookup database loaded on RigPi. The refresh process takes about 15 minutes to complete. Note the entire FCC database is updated by the FCC once per week.
LAN IP 1	RSS can connect to the Internet through Ethernet and/or Wi-Fi. If only Ethernet or Wi-Fi is used, LAN IP 1 is the IP address for that connection. Use LAN IP 1 for the LAN IP if you are setting up port forwarding in your Internet router.
LAN IP 2	If RSS is connected to the Internet through an Ethernet connection and through Wi-Fi, the Ethernet connection is shown in LAN IP 1 and the Wi-Fi address is shown in LAN IP 2.
WAN IP	WAN IP is the public IP of your connection to the Internet. This is the IP you can use to connect to RSS when away from home. You must set up port forwarding in your router for RSS and Mumble to operate remotely.
RPi Temp	Shows the temperature of the CPU chip on the Raspberry Pi. The core temperature goes up as the Raspberry Pi gets more heavily loaded. The maximum operating temperature is rated for 80-deg C. If the

	temperature goes above 85-deg, the CPU is throttled. Normally you will see the temperature under 50-deg C. The K1EL RigPi case has a fan that will keep the CPU cool.
Rigctl Port	The port used to control the radio for the current account. Use this port number if connecting to another application (such as Fldigi) and you want to have both RSS and the other application control the radio. You can also use this number to connect a second (or more) accounts to the current radio. Enter the port number in the Port field in Basic or Advanced Radio settings.
CCM Port	The port used to connect CommCat Mobile or CommCat to RSS to control the current radio.
RSS Vers	The current RSS version number
Update RSS Files	Update the RSS files to the most recent version. The update is a two-step process. The first step checks version numbers. If the version check shows an update is available, the second step installs the files from the RigPi web site. See Update RSS Files in Other Programs.
Get RSS Stats	Provides a brief summary of RSS Statistics, including time since last reboot, number of connected users, and system loading.

4.13 Scheduler

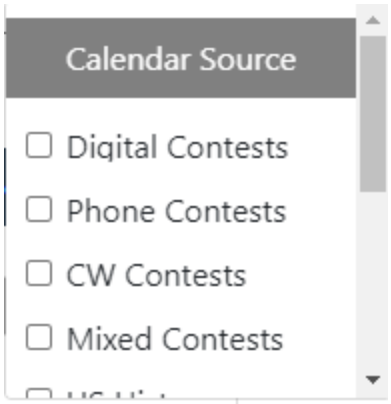
RigPi Scheduler is the settings window for RigPi Calendar. Scheduler provides a way to add events to Calendar for any day of the year. Events include reservations for rig use and custom events such as club meetings or skeds. You can overlay the Scheduler with event lists from external sources.



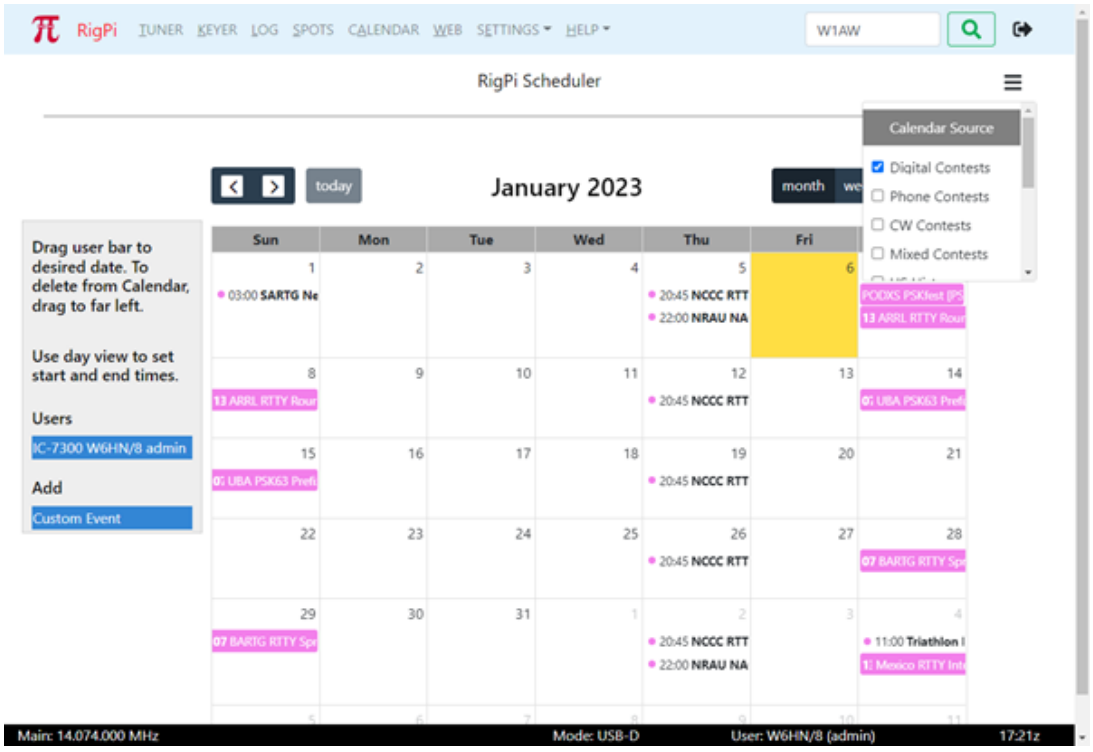
<	Go to previous month (or week/day/list delending on selected clanedar format).
>	Go to next month (or week/day/list depending on selected calendar format).
today	Show current month, week, day or list for current day.
month/week/day/list	Select calendar range.
Users	A list of users, including radio name, call, and username. Drag a user bar to the desired date to schedule.
Add	Add custom events.
Yellow day	Current day.

The "hamburger" button in the upper right corner of the Scheduler has additional options:

- Add a calendar overlay for ham contests and holidays.
- Remove all events.
- Remove custom events.



Selecting Digital Contests adds the digital contest overlay to the calendar. Each digital contest use a lavender color. A bar indicates an event lasting all day, while an event occurring at a specific time in the date has a colored dot.



custom.ics	Swedish calendar	iCalShare.com
cw.ics	Ham CW contests	DL2NBY
digital.ics	Ham digital contests	DL2NBY
phone.ics	Ham phone contests	DL2NBY
Events_in_History.ics	Events in US history	americanhistorycalendar.com
JapanHolidays.ics	Japanese holidays	

SwedishHolidays.ics	Swedish Holidays (duplicate of custom)	iCalShare.com
UKHolidays.ics	UK Holidays	iCalShare.com
us_hol.ics	US Holidays	https://www.thunderbird.net/en-US/calendar/holidays

Reserving a time slot

Each user account can be given reservations with start and end times. The RigPi Log In window shows current and upcoming reservations.

The video, below, shows a user bar being moved to a day. Without further action, the radio associated with that account will be reserved for the full day.

Drag User Bar to Make a 1-day Reservation

To set a specific time slot during the day for an event, open the day view and navigate to the day you want to edit. Drag the bar from the top to the starting time, then drag the bottom of the bar to the ending time.

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Remove this text from the manual
template if you want it completely blank.

Other Programs

5 Other Programs

Additional Ham software provided with RigPi Station Server is accessed through the Raspbian PIXEL Desktop. Click Pi Menu>Ham Radio to access the added ham programs.

Mumble, WSJT-X and Fldigi use the Raspberry Pi audio system, either through CODECs in the radio or through the MFJ RigPi Audio board. Only one program can use the audio system at a time. Close Mumble before using WSJT-X or Fldigi.

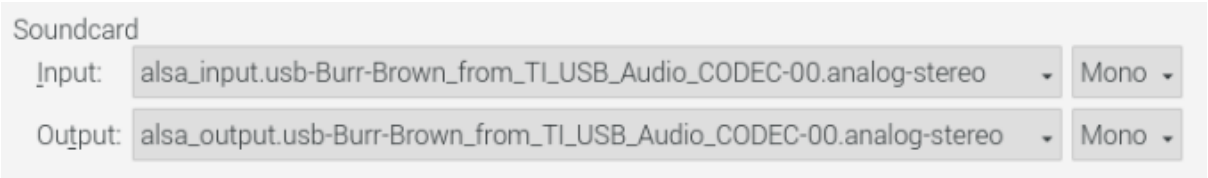
Using RigPi Station Server with WSJT-X

WSJT-X is designed to provide reliable communications in extreme weak-signal conditions. WSJT-X, written by Joe Taylor, K1JT, is installed on RigPi Server. Frequency and Mode data are shared between RigPi and WSJT-X, and QSO information logged in WSJT-X is automatically transferred to RigPi Log.

To start WSJT-X, from the Raspberry Pi Desktop, open the applications menu and select Ham Radio>wsjtx. The first time you start WSJT-X you are invited to enter your callsign and Grid locator.

Connect to a radio from the File>Settings>Radio panel. Start RigPi Station Server and connect the radio. Use the following values:

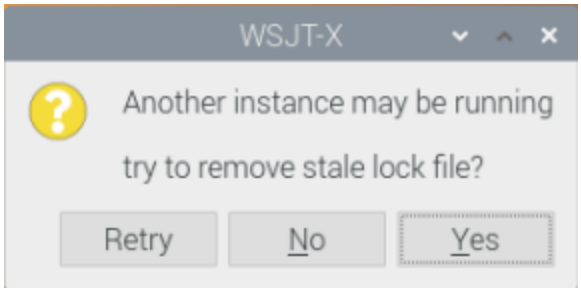
1. Rig: Hamlib NET rigctl
2. Network Server: localhost: 4532. The port will be different depending on which RSS account you are using. Radio 1 uses port 4532, radio 2 uses port 4534, and so on.
3. Audio: If using a radio that has CODECs, choose the alsa_input and alsa_output devices in the Input and Output drop-down lists in WSJT-X File>Settings>Audio>Soundcard. (The CODECs in your radio may have a different name.)

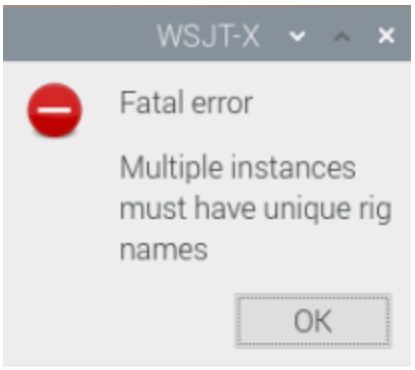


If using the RigPi Audio board (your radio doesn't have CODECs), make the following selections:

If you use incorrect audio devices, WSJT-X will display a dialog warning of a problem:

Some selections may not display an error at first, but after clicking Tune, then restarting WSJT-X, the following error appears:





This issue appears to be present in WSJT-X 2.4. You must reboot RigPi to clear the error before resetting the audio device selection.

Some radios do not have a PTT-by-CAT function. Select Hamlib GPIO in the H/W PTT drop down list in Advanced Radio settings for PTT. The CAT PTT setting is not used when you use Hamlib GPIO for PTT.

WSJT-X Manual: Click to open WSJT-X manual

WSJT-X User Forum: User Forum

Using RigPi Station Server with Fldigi

Fldigi is a multi-mode digital communications program, written by Dave Freese, W1HKJ and team.

1. Rig: Hamlib NET rigctl
2. Audio: Configure>Sound Card>Audio>Devices. use the audio selections as used in WSJT-X, above. Check Device supports full duplex.

Fldigi Manual: Fldigi Manual

Fldigi User Forum: User Forum

Logging WSJT-X and Fldigi contacts

When RigPi is controlling your radio, contacts logged in WSJT-X or Fldigi are transferred to your RigPi log. In SETTINGS>Accounts>Account Editor, put checks in the Sync boxes as desired.

Using TQSL for LoTW Uploads

LoTW/TQSL Manual: tQSL Quick Start

LoTW/TQSL User Forum: tQSL Forum

5.1 Overview

Additional ham radio programs are installed on RSS. The Other Programs topic provides information that relates to RSS and the program. For complete Help for each program, please refer to the respective program's web site.

Most of these programs are provided on an 'as-is' basis. Support for configuring, using and updating these programs is provided by the program authors and their user communities.

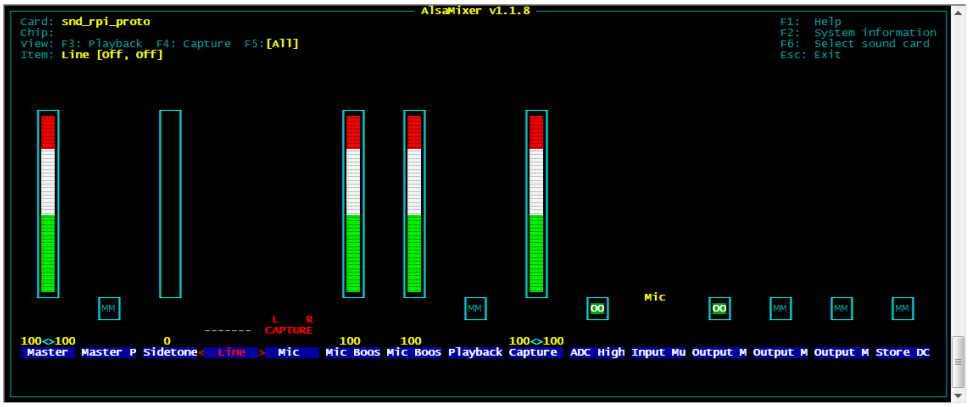
- WSJT-X
- JS8Call
- Fldigi
- Flrig
- Flarq
- Message Aggregator

- TrustedQSL (TQSL)
- Motion (Video)
- Mumble Autostart
- RSS Updater
- phpMyAdmin
- Audacity
- Alsamixer
- Nano

5.2 Alsamixer

RigPi Audio doesn't have settings of its own, but a Linux utility named Alsamixer is included with RSS for that purpose. You can also use the Audio Device Settings window opened from the Raspberry Pi Desktop applications menu found in the Preferences menu item. The driver used for RigPi Audio is snd_rpi_proto.

To start Alsamixer go to RSS Desktop and open the Terminal. Type alsamixer followed by return. The screen shot below shows the typical settings for the RigPi Audio board set up for Mic input.



- Left and right arrow keys select a setting
- M key toggles MM-OO settings
- Tab to change View (Playback, Capture, All)
- Up and Down arrow keys to change levels

RigPi Audio uses the Line or Mic Input depending on settings. The Line Input accommodates input voltages up to 2-volt peak-to-peak. The Mic input is for input levels up to .2-volt peak-to-peak. The Line input uses the left channel, it is not stereo. Input from the I/Q jack is stereo as required for Panadapters.

5.3 Claws Mail

Claws Mail is a light-weight email client providing a way to send and receive email. Claws Mail is not installed by default.

To install Claws Mail, go to Application Menu>Preferences>Recommended Software>Internet.

5.4 Connecting to RSS from External Programs

Connecting Multiple Programs to RSS

RSS combined with popular logging programs provides another layer of flexibility. The screen shot below shows RSS, CommCat (no longer published) and PowerSDR running on Windows. All programs are linked together. Not shown is CommCat Mobile running on an iPad also connected to RSS.

Important note: CommSoft's CommCat and CommCat Mobile have been discontinued as of October, 2020. If you have CommCat or CommCat Mobile you can continue to use them with RigPi. CommCat and CommCat Mobile are not required for RSS. It is best to connect to RSS using a browser.

A frequency change in one program is reflected by all programs.

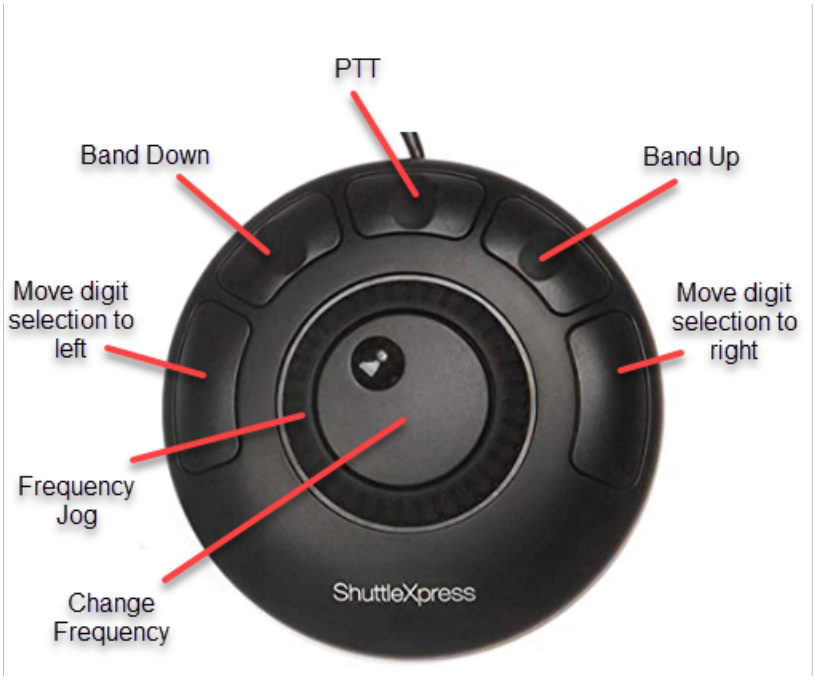
PowerSDR and other programs such as N1MM and HRD are connected to RigPi through a free Virtual Port program called RigPi Hub. This program is available for download from https://www.rigpi.net. Here are the details on how this is done.

The Kenwood TS-2000 CAT command set is used to connect CommCat to RSS via a separate TCP connection through a local network. The use of "TS-2000," below, is used for this purpose even though you may be controlling a completely different radio through RSS.

1. Open RSS in a Windows browser. RSS is controlling the radio.
2. Start RigPi Hub.
3. Start PowerSDR and connect as a TS-2000 to a RigPi Hub COM port.

RSS, RigPi Hub, and PowerSDR all show the same frequency and mode. Each can control the radio connected to RSS.

5.5 Contour ShuttleXpress



The Contour ShuttleXpress provides a convenient way to adjust the RigPi frequency and control PTT using a Windows or Mac computer through a USB port. (A ShuttleXpress driver is not available for Linux.) RigPi Preference files used to assign buttons and controls are provided for Chrome, Edge and Firefox browsers.

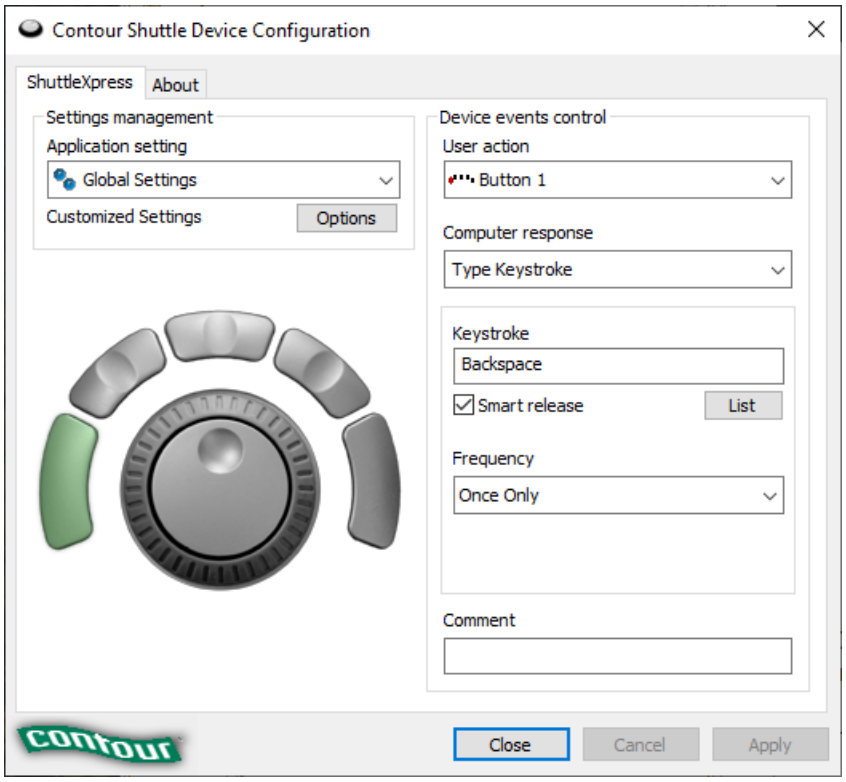
1. Download and install the Windows or Mac Driver program:

   https://www.contourdesign.com/shuttle-drivers/

2. Download and unzip the RigPi Shuttle preferences file:

   https://rigpi.net/downloads/RigPi-ShuttleXpress.zip

3. Start the Contour Shuttle Configuration Program (Windows)



4. Decide which browser you want to use, Chrome, Edge or Firefox. (If you want to another browser, you can create your own preferences file using instructions in the ShuttleXpress manual:

   https://mk0uniclone3cn8yi1ru.kinstacdn.com/wp-content/uploads/2019/02/shuttle-product-manual.zip

5. Browser preferences are already included in the Application setting list. The one you want to use must be deleted, and the corresponding RigPi preferences file imported. For example, if you want to use Chrome to control RigPi, delete the Google Chrome entry in the list.
6. Import the RigPi preferences file you want to use from the Options menu.
7. When your selected browser is in front the RigPi buttons and controls can be used.

5.6 Fail2Ban

Fail2ban, included with RigPi is an open-source intrusion prevention software that helps protect Linux-based systems from malicious attacks by monitoring log files and automatically taking action against potential threats. It works by detecting patterns of suspicious or unauthorized activity in log files and then blocking or banning the IP addresses associated with those activities.

Here's how Fail2ban typically operates:

1. Log File Monitoring: Fail2ban continuously monitors log files (e.g., system logs, web server logs, SSH logs) for specific patterns or events that indicate malicious activities such as failed login attempts, brute-force attacks, or other suspicious behavior.

2. Pattern Matching and Filters: Fail2ban uses regular expressions and predefined filters to analyze log entries and identify patterns of malicious activity. These filters define what constitutes a security breach or violation.

3. Ban Actions: Once a pattern is detected, Fail2ban takes action by temporarily or permanently blocking the offending IP address or range of addresses associated with the suspicious activity. This prevents further access from those sources.

4. Dynamic Ban Duration: Fail2ban typically imposes a temporary ban on the banned IP address for a configurable period. This dynamic ban duration helps protect against repeated or prolonged attacks.

5. Ban Actions Configuration: Fail2ban provides flexibility in defining the actions to be taken upon detection of malicious activity. This can include blocking IP addresses via firewall rules (e.g., iptables), sending notifications, or executing custom scripts.

6. Monitoring and Unbanning: Fail2ban keeps track of banned IP addresses and can automatically remove bans after the specified ban duration expires. It also provides tools for manual management, allowing administrators to unban specific IP addresses if necessary.

Fail2ban is commonly used to enhance the security of Linux servers, protecting services such as SSH, FTP, web servers, and more. By automatically detecting and responding to malicious activities, Fail2ban helps mitigate the risk of unauthorized access and potential system compromise.

Here is a simple guide to using fail2ban:

1. Configure Fail2ban:
   - Open the Fail2ban configuration file using the nano text editor:

```
sudo nano /etc/fail2ban/jail.local
```

- Customize the configuration based on your needs. Some important settings to consider:
  - `ignoreip`: Specify IP addresses or ranges to exclude from banning.
  - `bantime`: Set the duration (in seconds) for which an IP address is banned.
  - `maxretry`: Define the maximum number of login attempts allowed before an IP is banned.
  - Configure jail sections for the services you want to protect (e.g., SSH, Apache, etc.). Each jail section contains settings specific to that service.

- Save the configuration file and exit the text editor.

2. Enable and Start Fail2ban:
- Enable Fail2ban to start automatically on system boot:

```
sudo systemctl enable fail2ban
```

- Start the Fail2ban service:

```
sudo systemctl start fail2ban
```

3. Monitor Fail2ban:
- Check the status of Fail2ban to ensure it is running without errors:

```
sudo systemctl status fail2ban
```

- Monitor the logs for any banned IP addresses or other relevant information:

```
sudo tail -f /var/log/fail2ban.log
```

4. Customize Actions (Optional):
- Fail2ban provides various actions that can be customized, such as sending email notifications or executing custom scripts. You can modify these actions in the configuration file (`jail.local`) or create additional action files in the `action.d` directory.

6. Testing:
- You can test Fail2ban by intentionally triggering a banned action, such as attempting multiple failed SSH login attempts. Make sure to do this from a different IP address to avoid accidentally banning yourself.

That's it! Fail2ban will now monitor your system logs and automatically ban IP addresses that match the configured patterns. You can further customize Fail2ban's behavior and explore

advanced options as needed. Remember to periodically review Fail2ban's logs and adjust the configuration based on your system's requirements.

5.7 Fan Control

RigPi 4 supports temperature sensitive PWM fan control through GPIO physical pin 32. The software for Fan Control can be found here:

https://github.com/mattrude/raspberrypi-fan-manager/

This is a C program. The source code is provided in /home/pi/raspberrypi-fan-control. It is set to turn the fan on when the temperature reaches 52C and off when the temperature drops below 45C. There is an option to set the GPIO pin number. The PWM pin number must be set in /boot/config.txt. Instructions are provided in README.md.

Fan Control starts when the Raspberry Pi boots.

The K1EL RigPi Keyer board has two pins through which a fan is connected,

5.8 Flarq

FLARQ, also known as Fast Light Automatic Repeat reQuest, is a software utility that works in conjunction with the Fldigi application. FLARQ is designed to enhance the reliability of data transmissions over radio by implementing an automatic repeat request (ARQ) protocol.

The ARQ protocol is a mechanism used to ensure error-free data transmission in the presence of noise, interference, or weak signal conditions. It involves the automatic retransmission of data packets that are either corrupted or lost during transmission. This process continues until the packets are received correctly or until a predefined number of retransmissions is reached.

FLARQ integrates with Fldigi to provide a robust ARQ capability for digital communication. It enables reliable exchange of text messages, files, and other data over radio frequencies using various digital modes supported by Fldigi.

Here's a brief overview of how FLARQ works:

1. Data transmission: Fldigi encodes the data into the chosen digital mode and transmits it over the radio using the computer's sound card.

2. Reception and verification: FLARQ running in FLdigi's ARQ mode receives the data and verifies its integrity by performing error checking and correction.

3. Acknowledgment and retransmission: If errors are detected, FLARQ sends an acknowledgment signal to the sender, requesting retransmission of the corrupted or lost data

packets. FLARQ also keeps track of the sequence of packets to ensure proper order upon reception.

4. Retransmission process: The sender, upon receiving the acknowledgment, retransmits the requested data packets until they are successfully received by the recipient. The process continues until all data packets are error-free or the maximum number of retransmissions is reached.

FLARQ significantly improves the reliability of digital communication by automatically handling errors and ensuring the successful delivery of data. It is particularly useful in amateur radio applications where signal conditions may vary, and reliable transmission is essential.

See the Flarq web site for more information.

Flarq Web Site

5.9 Fldigi

Fldigi is a popular open-source software application designed for amateur radio digital communications. It stands for "Fast Light Digital modem application" and was developed by Dave Freese (W1HKJ) and his team. Fldigi is available for multiple platforms, including Windows, macOS, and Linux.

Fldigi offers a comprehensive set of features for transmitting and receiving various digital modes over radio frequencies. It utilizes a computer's sound card to convert audio signals to digital data and vice-versa. Some of the digital modes supported by Fldigi include:

1. CW (Morse code): Fldigi can send and receive Morse code signals using the computer's sound card as a keyer.

2. BPSK and QPSK: These are phase-shift keying modes used for sending data signals.

3. RTTY: Fldigi supports various RTTY (Radio Teletype) modes, including ASCII, Baudot, and AMTOR.

4. PSK31: A popular digital mode for text-based communication using phase-shift keying.

5. Olivia: A robust digital mode that provides good performance under weak signal conditions.

6. MFSK: Multiple Frequency Shift Keying mode suitable for keyboard-to-keyboard conversations.

Fldigi offers features such as signal decoding, error correction, frequency shifting, and audio filtering. It also includes tools for signal analysis, logging, and integrating with other software applications.

Fldigi is widely used by amateur radio operators around the world for various purposes, including emergency communications, contesting, experimenting with digital modes, and general communication. It provides a flexible and versatile platform for digital radio communication enthusiasts.

Detailed instructions are beyond the scope of this manual, please refer to the Fldigi web site:

Fldigi Web Site

This Help topic covers use of Fldigi in RSS.

Radio Connection

RSS and Fldigi both use the Hamlib radio control library. Using the Hamlib "Net rigctl" radio selection in Fldigi it is possible to have both RSS and Fldigi control the radio.

Connect RSS to your radio in SETTINGS>Radio. Go to Fldigi Configuration>Rig>Hamlib. Select Hamlib NET rigctl (Beta) for Rig and localhost:<RSS Port> for Network Server. You can now control frequency from Fldigi or RSS.

The <RSS port> is determined by the account you wish to use in RSS.. Use the port number shown in RSS SETTINGS>Radio>Rigctl Port.

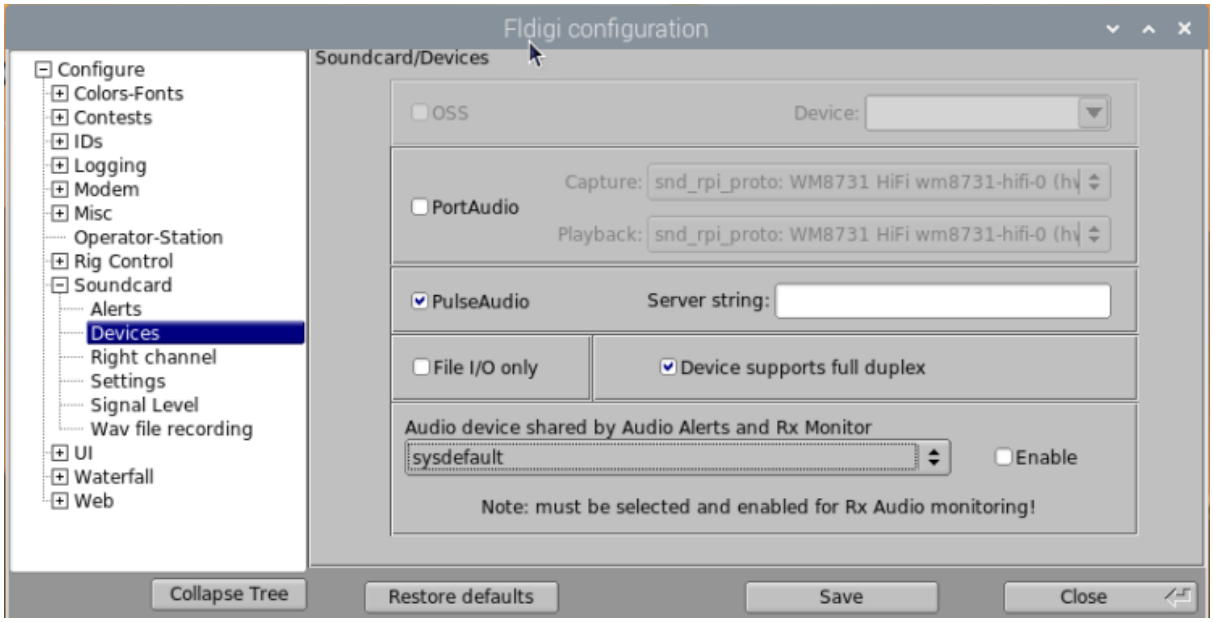
Logbook Connection

Contacts logged in Fldigi are automatically transferred to the active log in RSS for the account specified by the sync option in RSS SETTINGS>Users>Edit>Sync Fldigi Log.

Audio Connection

RigPi Audio or a radio CODEC is used for input and output audio for Fldigi. Since Audio is limited to one application at a time, make sure the Mumble Client used for VoIP is not running. Choose the audio capture and output devices in the Capture and Playback drop-down lists in Fldigi Configuration>Audio associated with your setup.

Use these settings:



Using RigPi Keyer with Fldigi

Fldigi supports the K1EL Winkeyer for sending CW. To configure RigPi Keyer, go to Configure>Config Dialog>Modem>CW>WinKeyer. Select /dev/ttyS0 for the Ser Port. Select other options as desired, then click Connect. The indicator light in the Connect button turns yellow, and "Connected ti Winkeyer h/w/version 30" is displayed in Fldigi. You can now use Fldigi to send CW through the RigPi Keyer. (Note: Fldigi will report that Winkeyer version 31 or higher is required to use the RigPi Keyer for the Fldigi TTY mode if an older chip is found.)

5.10 Flic Switch and iOS Shortcuts

Flic is a remote control switch that uses Bluetooth for communicating with phones, tablets, and Mac computers. For purchase a Flic or more information go to:

https://flic.io

The Flic has three modes: single, double, and long tap. Below are the steps to take to program a Flic for PTT on, PTT off, Power on and Power off. You do not need a Flic Hub for RigPi although using one means you don't have to use a phone or tablet at home. Four actions are described below, but the Flic has three modes. You can use more than one Flic to create combinations of actions.

1. Download the Flic app from the App store (for Apple devices) and the Play store (for Android devices.
2. Agree to accept Notifications
3. Agree to the Terms of Service
4. Create an Account
5. Tap the PHONE tab at the top
6. Click Add Flic to Phone
7. Tap and hold the Flic until it connects
8. Tap Finish

You will see "My Flic" on your screen.

1. Tap My Flic
2. Change the name to RigPi

PTT On

1. Tap the red + button to enter a new Click action for PTT On
2. Scroll down, open Advanced, and select Internet Request
3. Add this URL*:

   http://rigpi4.local/flic.php?n=1&u=<admin>

4. Tap your Flic once to send the PTT On command to your radio

PTT Off

1. Tap the red + button to enter a new Double Click action for PTT Off
2. Scroll down, open Advanced, and select Internet Request
3. Add this URL*:

   http://rigpi4.local/flic.php?n=2&u=<admin>

   (Substitute your username for admin)
4. Tap your Flic twice to send the PTT Off command to your radio

Power On

1. Tap the red + button to enter a new Hold action for Power On
2. Scroll down, open Advanced, and select Internet Request
3. Add this URL*:

   http://rigpi4.local/flic.php?n=3&u=<admin>

   (Substitute your username for admin)
4. Tap, double-tap, or hold to send the Power On command to your radio

Power Off

1. Tap the red + button to enter a new Hold action for Power Off
2. Scroll down, open Advanced, and select Internet Request
3. Add this URL*:

   http://rigpi4.local/flic.php?n=4&u=<admin>

   (Substitute your username for admin)
4. Tap, double-tap, or hold to send the Power Off command to your radio

Control Relay (see Relay Switching 185)

1. Tap the red + button to enter a new Tap action for Toggle Relay
2. Scroll down, open Advanced, and select Internet Request
3. Add this URL*:

   http://rigpi4.local/flic.php?n=5&u=<admin>&p=n

   (Substitute your username for <admin>, n is relay parameter x-y. X is the relay number, y is 1 for relay on and 0 for relay off. 0-0 resets all relays. 9-1 turns on all relays.)
4. Tap to send the Toggle Relay command to RigPi

Send CW message

1. Tap the red + button to enter a new Tap action for Toggle Relay
2. Scroll down, open Advanced, and select Internet Request
3. Add this URL*:

   http://rigpi4.local/flic.php?n=6&u=<admin>&p=<cw message>

   (Substitute your username for admin, <cw message> is the desired CW text.)

4. Tap to send the CW Message command to RigPi

Frequency

1. Tap the red + button to enter a new Tap action for Toggle Relay
2. Scroll down, open Advanced, and select Internet Request
3. Add this URL*:

   http://rigpi4.local/flic.php?n=7&u=<admin>&p=<frequency>

   (Substitute your username for admin, <frequency> is the desired frequency to the nearest Hz.)

4. Tap to send the Set Frequency command to RigPi

Set to FT8 on Band

1. Tap the red + button to enter a new Tap action for Toggle Relay
2. Scroll down, open Advanced, and select Internet Request
3. Add this URL*:

/http://rigpi4.local/flic.php?n=8&u=<admin>&p=<band>

(Substitute your username for <admin>, <band> is the desired band, such as 80, 40, or 20.)

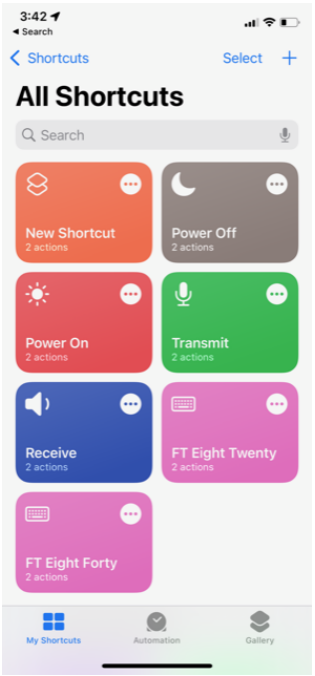
4. Tap to send the Toggle FT8-on-Band command to RigPi

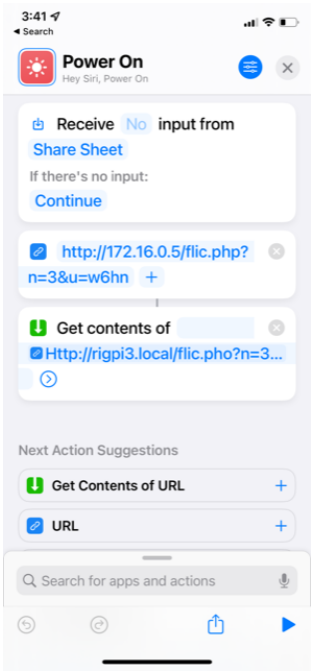
* The URL rigpi4.local is not recognized by Android devices. Use the IP for RigPi instead. The IP can be found in RigPi>SETTINGS>System.

Use rigpi4.local or the RigPi IP when using Flic on the same network as RigPi. For the Flic to work when away from home, use the WAN IP shown in SETTINGS>System. You may want to use a second Flic for use when away from home. Port 80 must be opened in your router to use Flic away from home.

iOS Shortcuts

Apple iOS devices have a feature called Shortcuts. Shortcuts can be used to trigger actions, the same as Flic switches. The same command strings are used.





Use iOS shortcuts on your local LAN without port forwarding. If you want to use Shortcuts away from home, use your WAN (Internet) IP and open port 80 for forwarding.

5.11 Grig

Grig is a simple graphical user interface (GUI) for controlling radios using the **Hamlib** radio control library. It provides an easy way to interact with supported transceivers via a computer, allowing users to adjust frequency, mode, and other settings.

Key Features of Grig:

- Supports **Hamlib**, which enables control of many different radios.
- Provides a **lightweight** and **easy-to-use** GUI.
- Allows **basic rig control** functions such as frequency tuning, mode selection, and PTT (Push-to-Talk) control.

Use Cases:

- **Digital Modes**: Works with software like RigPi FLDigi and WSJT-X.
- **Remote Operation**: Control your transceiver from a different location.
- **Automation & Logging**: Helps integrate with logging software for contesting or general QSO logging.

You can start **Grig** from the Raspberry Pi Run menu with optional parameters to customize its behavior. Here are the key parameters:

Basic Usage:

```
grig [options]
```

Common Parameters:

Option	Description
-m <model>	Sets the radio model number (as defined in Hamlib).
-r <device>	Specifies the serial port or IP address (e.g., /dev/ttyUSB0 or 192.168.1.100).
-s <baud>	Sets the serial baud rate (e.g., 9600, 115200).
-c <id>	Specifies the radio configuration string.

-d	Enables debug output.
-h	Displays help information.

Example Commands:

1. **Start Grig with an Icom IC-7300 connected via USB:**
   grig -m 3073 -r /dev/ttyUSB0
2. **Enable debugging output:**
   grig -d

5.12 JS8Call

JS8Call is a derivative of the WSJT-X application, structured and redesigned for message passing. It is not supported by, nor endorsed by, the WSJT-X development group.

This Help topic covers use of JS8Call in RSS.

Radio Connection

RSS and JS8Call both use the Hamlib radio control library. Using the Hamlib "Net rigctl" radio selection in JS8Call it is possible to have both RSS and JS8Call control the radio.

Connect RSS to your radio in SETTINGS>Radio. Go toJS8Call File>Settings>Radio. Select Hamlib NET rigctl for Rig and localhost:<RSS Port> for Network Server. You can now control frequency from JS8Call or RSS.

The RSS port is determined by the account you wish to use in RSS. Use the port number shown in RSS SETTINGS>Radio>Rigctl Port.

Logbook Connection

Contact logged in JS8Call are automatically transferred to the active log in RSS for the account specified by the sync option in RSS SETTINGS>Users>Edit>Sync WSJTX Log. Log data are transferred using the N1MM Logger+ Broadcasts options in JS8Call12060 File>Settings>Reporting. RSS expects a connection on N1MM Server port number 12060.

Audio Connection

RigPi Audio or radio CODECs are used for input and output audio for JS8Call. Since Audio is limited to one application at a time, make sure Mumble used for VoIP is not running. Choose default in the Input and Output drop-down lists in JS8Call File>Settings>Audio>Soundcard.

5.13 LibreOffice

LibreOffice is a suite of programs you can use for office tasks. The programs include:

- Word Processor
- Spreadsheet
- Presentation
- Drawing
- Database
- Equation Editor

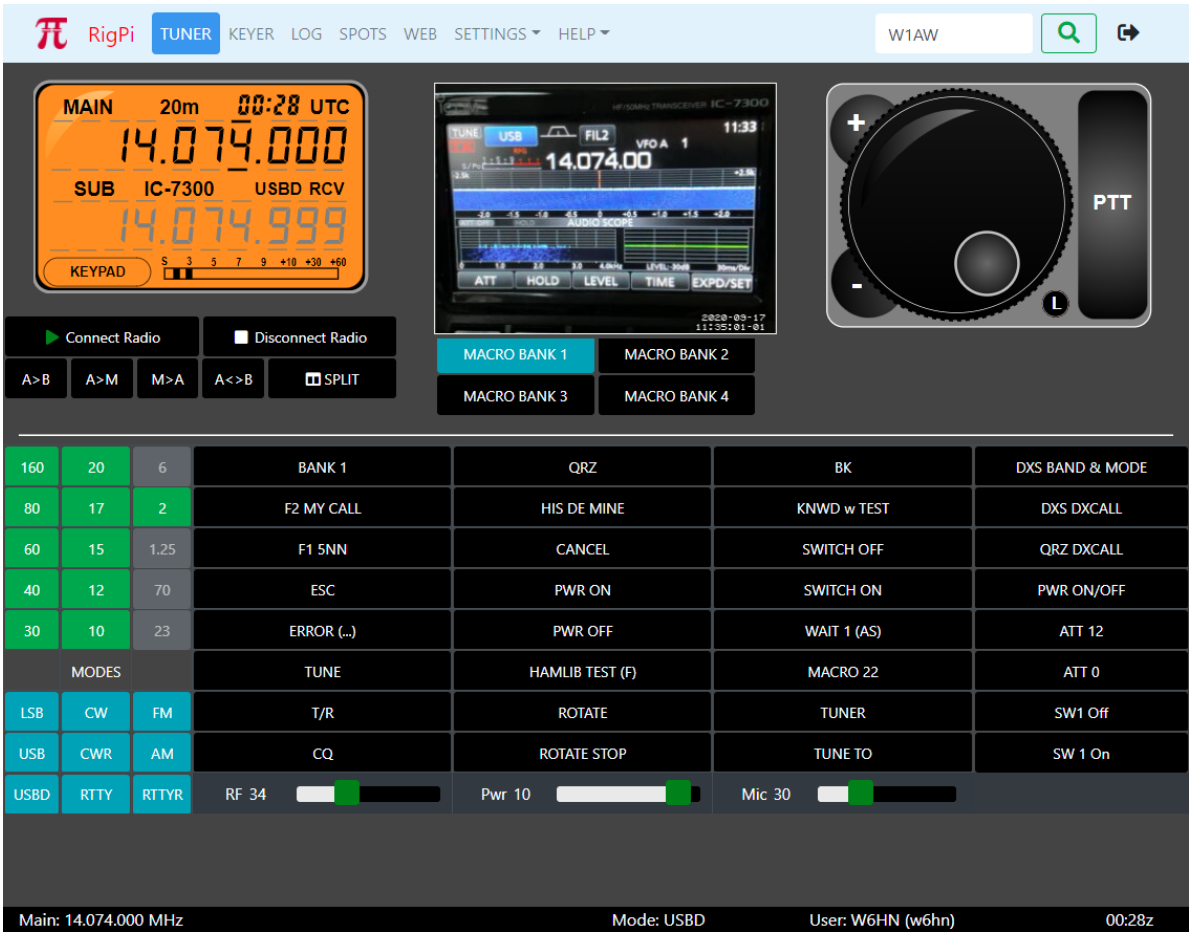
LibreOffice is *not* installed by default. To install, go to Application Menu>Preferences>Recommended Software>Office.

5.14 Message Aggregator

Message Aggregator implements the server side of the message protocol used by WSJT-X. WSJT-X is a client of the protocol. Message Aggregator is not installed by default. Download and install from https://w1hkj.org.

5.15 Motion (Video)

Motion is an application for creating streaming video. Motion is installed and configured on RigPi. The primary use for RigPi video is to keep an eye on your radio while operating remotely.



Motion can use most webcams. Plug a webcam into one of the USB ports on RigPi and Motion will find it.

Extensive control over Motion is provided through a configuration file. To view and edit this file, use the following command from Terminal:

sudo nano /etc/motion/motion.conf

For example, if you wish to disable Motion if you will not use the video feature, edit the line 'daemon on' to 'daemon off'. The height of width of the camera image is determined by the height and width parameters. This affects the size of the capture image, not the displayed image. You can see the captured image in rigpi4.local:8081. Increasing the frame-rate will decrease the video lag time, but will increase the computing resources required.

You can change the width and height of the image in the Tuner window by editing the html in /var/www/html/index.php. There are three places the size can be changed.

The Motion log is located in /var/log/motion/motion.log

RigPi RadioCam video can replace the Tuning Knob, S-meter or Frequency panel on the Tuner window. See the Advanced Radio 111 Settings topic for how to set the mode you wish to use.

The view option you choose in Advanced Radio settings will affect the appearance of video on a mobile device.

No Video: the Frequency Panel and Tuning knob are shown.

Video -> S-meter: The Frequency Panel, Video and Tuning Knob are shown.

Video -> Frequency Panel: Video and Tuning Knob are shown

For more help, go to

https://motion-project.github.io/

If the frame for the video shows with no contained video, check the ad blocker on the browser you are using. If using Chrome on iOS, go to Chrome settings and enable Allow Cross-Website Tracking.

5.16 Mumble

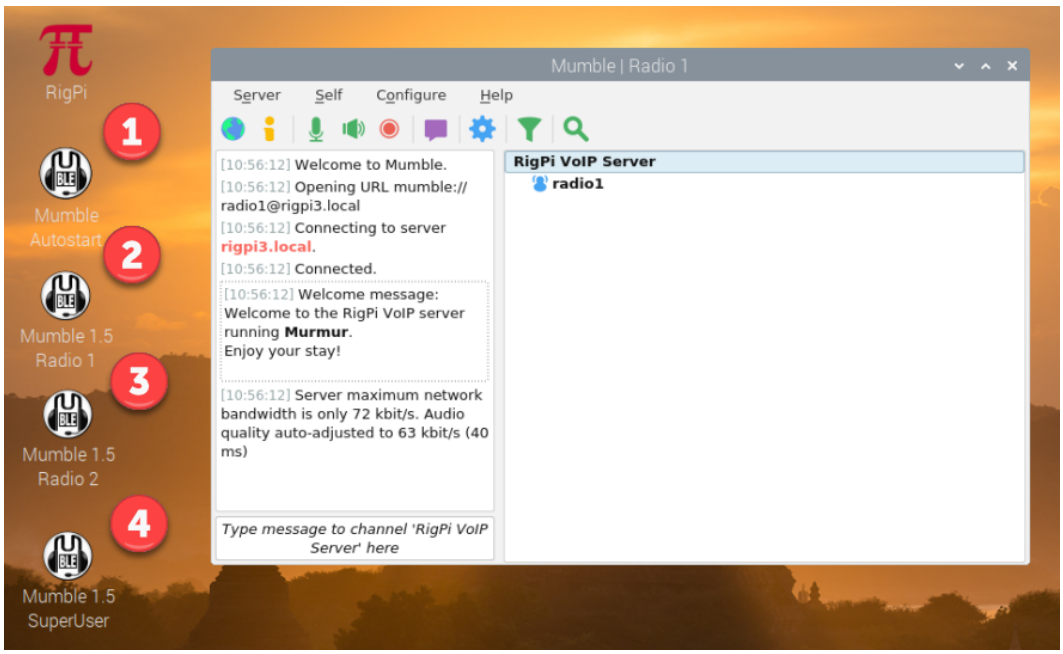
Mumble is an open source VoIP system. A VoIP server called Murmur is installed on RSS along with a Mumble client. The MFJ RigPi Audio board normally provides an input and output path for this Mumble client, although USB audio sound devices or radio CODECs can also be used. One radio can be connected to the Mumble client. Remote Mumble clients can also connect to the server and receive and send audio. Free Mumble clients are available for all popular operating systems.

The Murmur Server is named RigPi VoIP Server and the configured Mumble Client is named Radio1. Mumble can be started manually from the RSS Desktop by selecting Radio 1. A utility named Autostart is on RSS Desktop. Run Mumble Autostart to have Mumble start automatically when RSS is rebooted.

A second instance of Mumble can be started using Radio 2. Radio 2 uses its own audio device or radio CODECs.

The Mumble SuperUser account is used to change advanced settings. The SuperUser account has access to settings not available for normal accounts, but does not process audio.

When you start Mumble the Mumble window opens on RSS:



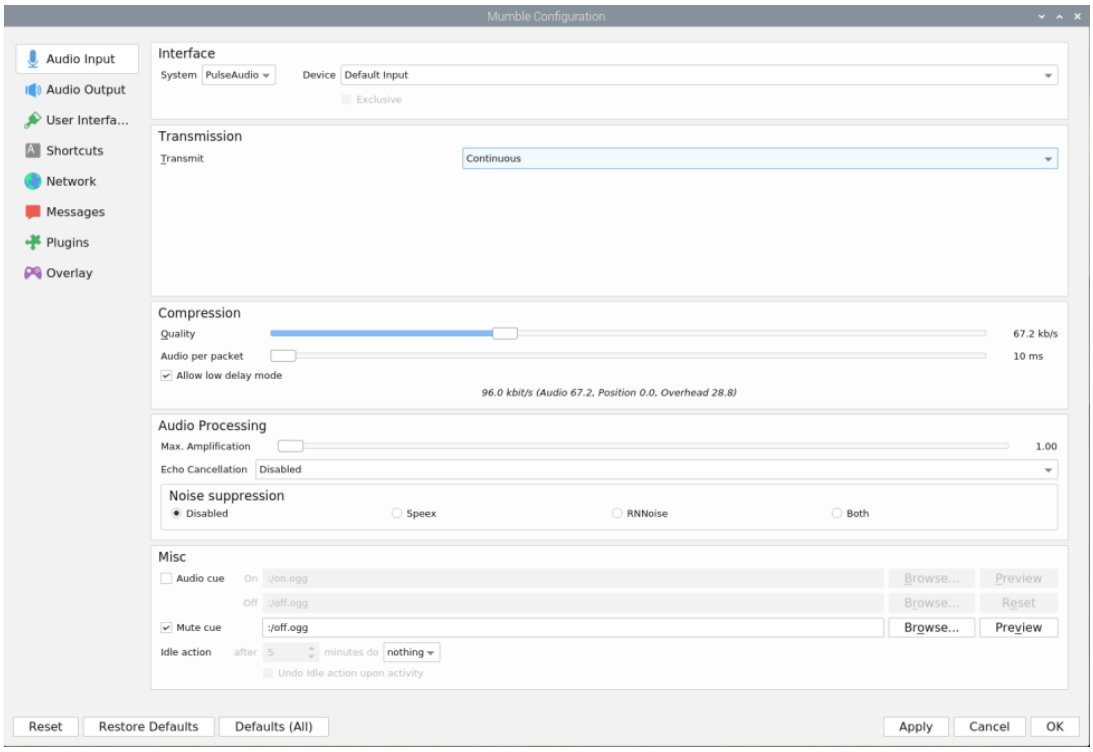
Mumble Settings

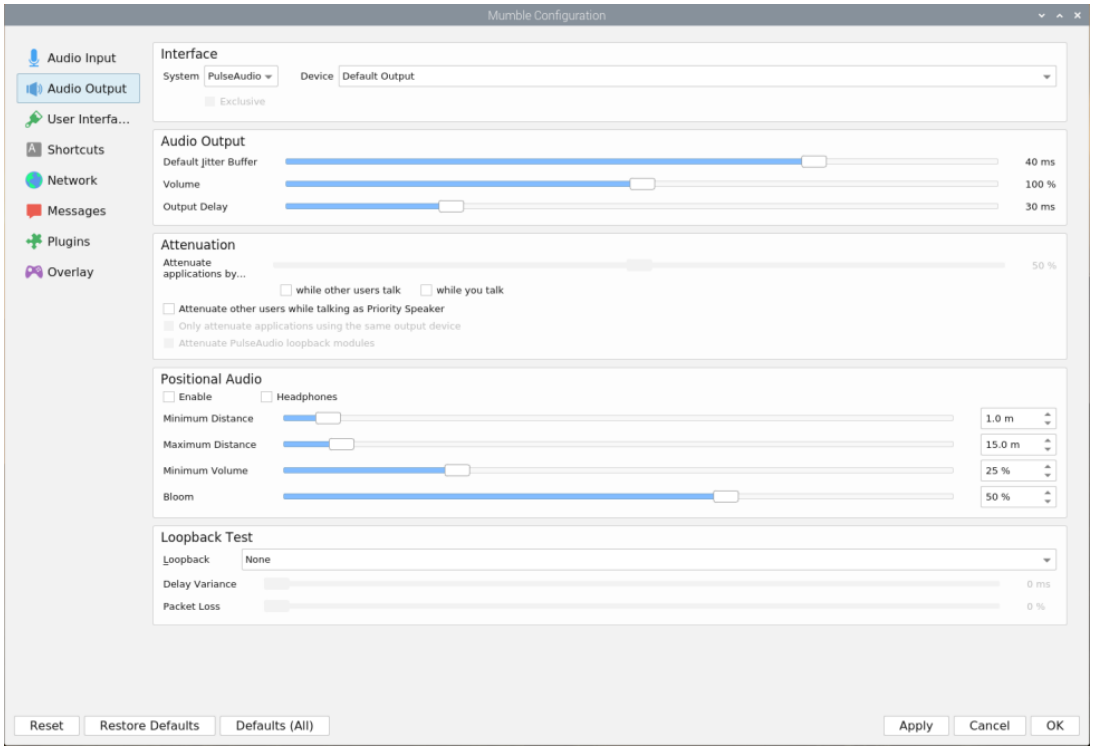
If you make any changes to Mumble settings, click Apply at the bottom of the settings window to test. When you are satisfied, click OK. Close Mumble before rebooting RigPi or else you will see an error message when restarting.

Mumble uses RigPi Audio for input and output audio, audio USB dongles, or CODEC's from your radio.

Refer to Mumble Help for setting up Mumble. One setting that applies to Mumble in RSS is found in the Audio Processing group of Mumble Configure>Settings>Audio Input. Set the Audio Processing to Disabled. If Noise Suppression is enabled the normal background noise on HF can cause distortion and clicking in the audio output. (See screen shot below.)

Mumble Clients can send audio continuously, by use of a Mumble PTT key, or by detecting voice activity (VOX). The screen shots below are shown below to include all audio in and audio out settings. The settings shown are typical. You will have to adjust them to maximize audio quality with your RigPi.





In Mumble Configure>Settings>Network enable the 'Reconnect automatically' and 'Reconnect to last server on startup' options.

Audio Input

System (MFJ RigPi audio board): Select ALSA from the System drop-down list. In Device, [hw: CARD=sndrpiproto, DEV=0] snd_rpi_proto, WM8731 HiFi wm8731-hifi-0 Direct hardware device without any conversion.

System (Radio CODEC): Select the Microphone and Speaker CODEC settings in the Desktop Menu bar. Select PulseAudio from the System drop-down list. In Device, select Default Device.

Transmit: This lets you change what causes audio from your radio to be sent. "Continuous" is recommended, but you can also have Mumble attempt to transmit only when there is active audio from your remote device. Voice Activity is useful to show an audio level bar graph which can help when finding the correct settings.

Audio Cue: This causes a sound to play whenever you press or release the Push-To-Talk key. Not active when Continuous Transmission is selected.

Quality: This is the quality at which Mumble will encode audio from your radio. It is recommended that you leave this at **40.0 KB/s**. However, if the audio sounds distorted, you can try raising or lowering this value.

Audio per packet: This is the amount of audio that Mumble sends at a time. A lower value means less latency, but might potentially introduce quality loss, if too low. I recommend that you leave this at **20 ms**.

Noise Suppression: Mumble can automatically filter out static background noise. When set to Speex, RNNoise or Both, a slider adjusts how aggressively noise is filtered. If filtering is too aggressive, then your voice may become distorted. Leave Noise Suppression Disabled to remove all noise suppression.

Max. Amplification: This setting controls how loud the receive audio is.

Audio Output

System (RigPi audio board): Select ALSA from the System drop-down list. In Device, select [hw: CARD=sndrpiproto, DEV=0] snd_rpi_proto, WM8731 HiFi wm8731-hifi-0 Direct hardware device without any conversion.

System (Radio CODEC): Select PortAudio from the System drop-down. In Device, select Default.

Default Jitter Buffer: If your mic audio is distorted, metallic, or sounds like a robot, try increasing this setting a notch or two.

Volume: Output volume. The volume setting for audio sent to the radio's mic/audio input.

Output Delay: If your transmit audio is distorted or is breaking up, try increasing this value.

Attenuate applications by...: This setting determines how much Mumble will reduce other applications' volume when people talk. A setting of 100% means to mute other applications; 0% means do not do anything to other applications. Additionally, you can select to attenuate when others talk, and/or when you talk with the "while other users talk" and "when you talk" check boxes.

Loop back: This is a super handy feature for troubleshooting problems with your transmit audio settings. You can set Mumble to "loop back" to you, so you hear what you are saying the way other people will hear you. When troubleshooting, try setting this to "Server", and then tweak options in Audio Input and Audio Output to get your audio sounding just right. Remember to set it back to "None" after you're finished, or else nobody will be able to hear you

Managing Accounts

If you wish to remove clients that have been registered, use the SuperUser account. The SuperUser can delete registered accounts.

Using a Remote Server

RSS is can use an external Mumur server. If RSS is connected to the Internet and you expect to have a large number of users, a remote Murmur server may be attractive. In addition, port forwarding is not required when using a remote Mumble server, making the connection easier to accomplish.

Murmur servers are available for free or low cost. Commercial server companies typically charge based on the number of "slots" you want to use. A slot is a unique user logged in to the server. Server fees typically run less that $2 per month per slot. Details for connecting to a remote server are beyond the scope of this manual, but instructions are usually given on the server you choose.

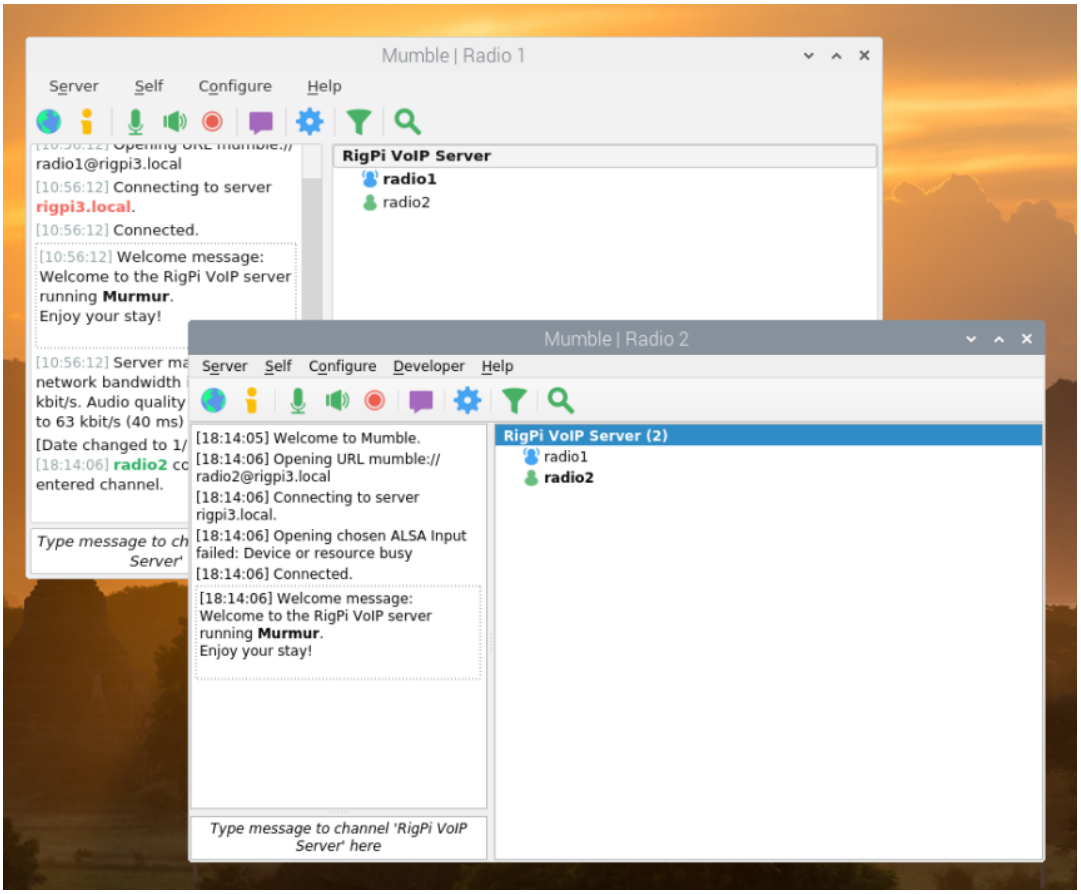
One commercial Mumble service is mumble.com. Up to a 50% discount is available if you commit to more than one year. mumble.com also provides a way to connect through a web browser rather than a Mumble c4043lient. This can be done by using the URL https://<your account>.mumble.com:4043

Running more than one Mumble client

Using the Radio2 client makes it possible to simultaneously run audio from more than one radio through RSS.

There are two requirements.

1. You need one (or more) audio IO devices in addition to RigPi Audio. This can be done with a USB audio dongle. For my tests I used a Griffin dongle, but any inexpensive USB/Audio device should work well.
2. The second Mumble client is started with parameters -m and -n.



Now you can log in. Radio2 is used as the username. With two clients you see both users in the client lists, radio1 and radio2. The user connected with its primary client is shown in bold. Assign the audio dongle to the second client. Now you can connect the audio to/from two rigs.

Since all users hear all other users, you will hear audio from both radios. That has interesting possibilities, such as monitoring 2 repeaters at once. You may want to control the audio from the two radios separately using macros. Sample macros for muting USB and analog audio levels are provided in macro bank 2.

Install Bonjour

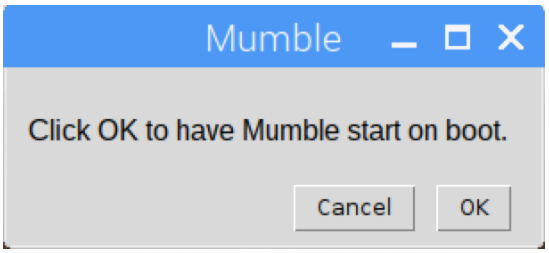
The Mumble server requires that Bonjour be installed on your computer for clients to connect. If you are using a Windows computer, follow the instructions here 206. Bonjour is included on Mac computers.

5.17 Mumble Autostart

Mumble Autostart is a program that controls how Mumble is started. Mumble Radio 1 can be started manually through the Desktop>Mumble option or by having it start automatically when RSS is started or rebooted.

You must start Mumble Radio 2 manually from the Desktop icon.

The Mumble Autostart program icon is located on the RSS Desktop.



5.18 Panadapter

IQ Panadapter software is not provided with RSS. Here is a link to AA6E's web page that describes the Tiny Python Panadapter originally published in the April 2014 issue of QST. An I/Q connection is provided on RigPi Audio to provide wide-band stereo audio to Panadapter programs.

AA6NE Panadapter

5.19 Relay Switching

The Sainsmart 8-channel 12V Relay Module is compatible with RigPi. It is controlled from one of the Raspberry Pi USB ports using a standard USB A/B cable. It requires an external 12 V power supply.

The module can be purchased from Sainsmart, https://sainsmart.com

The relays are able to switch 28 VDC or up to 250 VAC at 10 amps.

There are several caveats...

- When you power up the Raspberry Pi or reboot, the relays are toggled several times. According to Sainsmart, this is a characteristic of the FTDI chip used on the board.
- Be careful when connecting a 12 V power supply to not reverse the polarity. There is no protection against reversed voltage on the board.
- To control the Relay Module, select Macro Decimal or Band BCD in the Slv Cmnd drop down list. Set the Slave Port to the long name for the FTDI USB connection.
- Each relay module can be controlled by any account.
- You can use several relay modules, one per account. More than one FTDI USB cable can used for multiple relay boards or radios.

The relays can be toggled automatically in the BCD Band mode, or individually via macros in the Macro Decimal mode. You can also use a Flic switch to toggle relays. Macros for the Macro Decimal mode can be stacked, so !SW1-1!SW3-1 turn relays 1 and 3 on. !SW1-0!SW3-1 turns relay1 off and relay 3 on.

See the Advanced Radio 111 topic for settings and the Flic topic 168 for Flic programming instructions.

5.20 TrustedQSL

Open source libraries and utilities to support using digital signatures for Amateur radio QSL information. It can be used to digitally sign and upload QSOs to the ARRL's Logbook of the World (LoTW) online service and to manage the Callsign Certificates used when digitally signing. TQSL accepts QSOs in a log file whose format is either ADIF or Cabrillo, which RSS can create.

5.21 UFW Firewall

The UFW firewall is included with RigPi as an added security measure. It can be enabled or disabled using Terminal.

```
sudo ufw enable
sudo ufw disable
```

To see UFW Help from Terminal:

```
man ufw
```

UFW stands for Uncomplicated Firewall. It is a user-friendly command-line tool used to manage firewall rules on Linux systems. UFW provides a simplified interface for configuring

and managing the netfilter firewall, which is built into the Linux kernel. It is designed to make the process of setting up a firewall easier for users who may not be familiar with complex firewall concepts.

Here are some key features of UFW:

1. Ease of use: UFW aims to provide a straightforward interface for managing firewall rules, making it accessible to both novice and experienced users.

2. Command-line interface: UFW is primarily used through the command line, where users can enable or disable the firewall, add or remove rules, and view the status of the firewall.

3. Default policies: UFW follows a default deny incoming rule and a default allow outgoing rule. This means that incoming connections are blocked by default unless explicitly allowed, while outgoing connections are permitted.

4. Application profiles: UFW includes predefined application profiles that allow users to enable firewall rules for commonly used services such as SSH, HTTP, HTTPS, and more. These profiles simplify the process of allowing or denying access to specific services.

5. Simple syntax: UFW utilizes a straightforward syntax for adding rules. Users can specify ports, protocols, and IP addresses to define the desired network traffic rules.

6. Integration with iptables: UFW is built on top of the underlying iptables framework, which is a powerful firewall utility in Linux. UFW simplifies iptables management by providing an easier syntax and a higher-level interface.

It's important to note that UFW is primarily used on Ubuntu and Debian-based systems, but it can also be installed and used on other Linux distributions.

To see a list of open port in RigPi, open Terminal on the Raspberry Pi desktop and use the command:

```
sudo ufw status
```

as shown below.

```
64738/tcp          ALLOW       Anywhere
64738/udp          ALLOW       Anywhere
8080/tcp           ALLOW       Anywhere
8081/tcp           ALLOW       Anywhere
30040/udp          ALLOW       Anywhere
5900/tcp           ALLOW       Anywhere
23/tcp             ALLOW       Anywhere
22/tcp             ALLOW       Anywhere
3001/tcp*          ALLOW       Anywhere
80/tcp (v6)        ALLOW       Anywhere (v6)
64738/tcp (v6)     ALLOW       Anywhere (v6)
64738/udp (v6)     ALLOW       Anywhere (v6)
8080/tcp (v6)      ALLOW       Anywhere (v6)
8081/tcp (v6)      ALLOW       Anywhere (v6)
30040/udp (v6)     ALLOW       Anywhere (v6)
5900/tcp (v6)      ALLOW       Anywhere (v6)
23/tcp (v6)        ALLOW       Anywhere (v6)
22/tcp (v6)        ALLOW       Anywhere (v6)
3001/tcp (v6)      ALLOW       Anywhere (v6)

30001              ALLOW OUT   Anywhere
30001 (v6)         ALLOW OUT   Anywhere (v6)
```

*Note: TCP port 30001 will change depending on which RigPi account you are using. Account 1 uses 30001, account 2 uses 30002, and so on.

5.22 Update RSS Files

Updating the files for RSS is done automatically when a new minor version is detected, or manually from the SETTINGS>System menu. Updates provided on the https://rigpi.net server are downloaded to RSS, unzipped and copied to the correct RSS folders. Only files newer than a corresponding file are updated. The update retains all user settings and databases.

To update manually:

1. In RSS go to SETTINGS>System and click Update RSS Files. If a new version is detected, click OK to proceed.

2. When the update is done click OK to reboot RigPi to refresh all files.

Updating RSS files does not update any system files or other installed programs.

5.23 WSJT-X

WSJT-X is a computer program used by amateur radio operators for weak signal communication. It is designed to facilitate communication on specific amateur radio bands using digital modes, particularly for contacts that are difficult or impossible to establish with traditional voice or Morse code transmissions.

WSJT-X was developed by Dr. Joe Taylor, K1JT, and a team of contributors. It stands for "Weak Signal Communication, by K1JT" and is named after its creator. The software incorporates several digital communication modes optimized for weak signal propagation, such as JT65, JT9, FT8, and FT4. These modes use highly efficient encoding and decoding techniques to allow for reliable communication even under challenging radio propagation conditions.

The primary use of WSJT-X is in the field of amateur radio, where it enables operators to make contacts over long distances with low power and inefficient antennas. The software uses a time-synchronized protocol, allowing for accurate time and frequency calibration, and it includes features like automatic logging, signal reporting, and advanced error correction algorithms.

WSJT-X has gained popularity among amateur radio operators worldwide due to its effectiveness in weak signal communication, making it possible to establish contacts that would otherwise be difficult or impossible. It has become an essential tool for those interested in DXing (making long-distance contacts) and conducting scientific experiments related to radio propagation and space weather.

Detailed instructions are beyond the scope of this manual, please refer to the WSJT-X web site:

WSJT-X Sourceforge

This Help topic covers use of WSJT-X in RSS.

Radio Connection

RSS and WSJT-X both use the Hamlib radio control library. Using the Hamlib "Net rigctl" radio selection in WSJT-X it is possible to have both RSS and WSJT-X control the radio.

Connect RSS to your radio in SETTINGS>Radio. Go to WSJT-X File>Settings>Radio. Select Hamlib NET rigctl for Rig and localhost:<RSS Port> for Network Server. You can now control frequency from WSJT-X or RSS.

The RSS port is determined by the account you wish to use in RSS. Use the port number shown in RSS SETTINGS>Radio>Rigctl Port.

If your radio requires PTT control on an ACC connector to switch audio routing, use the H/W PTT Hamlib GPIO option in Advanced Radio settings.

Logbook Connection

Contacts logged in WSJT-X are automatically transferred to the active log in RSS for the account specified by the sync option in RSS SETTINGS>Users>Edit>Sync WSJTX Log. Log data are transferred using the Secondary UDP Server options in WSJT-X. RSS expects a connection on N1MM Server port 2333

Make sure the three following settings are set on WSJT-X Settings Reporting tab are set:

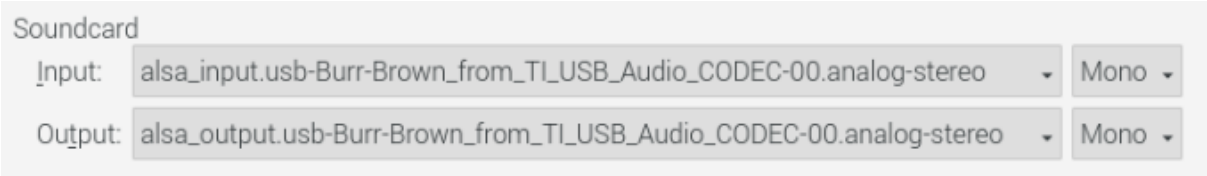
File>Settings>Reporting. Bottom of page.

1. Enable logged contact ADIF broadcast is checked
2. Server name or IP address = 127.0.0.1
3. Server port number = 2333

Audio Connection

RigPi Audio or a radio CODEC is used for input and output audio for WSJT-X. Since Audio is limited to one application at a time, make sure the Mumble VoIP client program isn't running.. Select your sound source in the Input and Output drop-down lists in WSJT-X File>Settings>Audio>Soundcard.

If your radio has internal CODECS, use these settings (may vary depending on your radio):



5.24 ZeroTier

ZeroTier is a software-defined networking (SDN) platform that enables secure and scalable connectivity between devices, servers, and applications over the Internet. It is designed to create virtual local area networks (VLANs) or software-defined networks (SDNs) that can span across different physical locations, allowing devices to communicate as if they were on the same local network, regardless of their physical location or the underlying network infrastructure.

Key features of ZeroTier include:

- **Global Reach:** ZeroTier allows devices to communicate with each other over the Internet without the need for complex networking configurations. It can connect devices across different networks, such as home networks, corporate networks, or public Wi-Fi.
- **Security:** ZeroTier uses end-to-end encryption to secure the communication between devices. This ensures that data is protected from eavesdropping and unauthorized access.
- **Ease of Use:** Setting up ZeroTier is typically straightforward. Users need to install the ZeroTier client on their devices and join a common network by entering a unique network ID. Once connected, devices can communicate with each other as if they were on the same local network.
- **Multi-Platform Support:** ZeroTier supports a wide range of platforms, including Windows, macOS, Linux, iOS, Android, and more. This makes it versatile and compatible with various devices.
- **Open Source:** ZeroTier is partially open source, which means that the source code for some components is available for review and modification. This can be beneficial for security-conscious users and organizations.

ZeroTier is often used in scenarios where traditional networking solutions might be impractical, such as remote work, multi-cloud environments, or for creating isolated networks for specific applications. It provides a way to extend network connectivity in a secure and flexible manner.

The ZeroTier client, zerotier-cli, is installed on RigPi. You must set up a (free) account on ZeroTier to use the service.

- Create a ZeroTier network
- Join the network from two devices
- ping one device from the other over the ZeroTier network

Instructions for creating a network are here.

You must enable ZeroTier, it is disabled by default. To start:

```
sudo systemctl enable zerotier-one
```

Using Terminal, use this command to then start ZeroTier:

sudo service zerotier-one start

To exit ZeroTier:

sudo service zerotier-one stop

To disable ZeroTier:

sudo systemctl disable zerotier-one

Once you have the connection configured you can use RigPi, Mumble, and Remote Desktop from anywhere in the world without modifying your router settings.

Important Note

ZeroTier does NOT support a Wi-Fi connection, you must use Ethernet. If you attempt to connect to ZeroTier using Wi-Fi, the Wi-Fi will be shut down on the Raspberry Pi. To reset the Wi-Fi connection,follow these steps:

Start Terminal on the Raspberry Pi desktop
Enter: sudo systemctl enable NetworkManager
Reboot: sudo reboot now

Technical

6 Technical

Information about technical aspects of RSS are contained in this section.

6.1 Glossary

Term	Definition
ARRL	The American Radio Relay League (**ARRL**) is a worldwide organization of amateur radio operators with its headquarters in Newington, Connecticut, USA.
Account	RSS provides user accounts with usernames and passwords. Each account manages a radio, keyer, and rotor.
Ajax	Asynchronous JavaScript and XML is a method of building interactive applications for the Web that process user requests immediately. Used in RigPi.
API	Application Programming Interface
Bootstrap	An open source toolkit for developing web content with HTML, CSS, and JS provided by Twitter. Used in RigPi.
CAT	Computer Aided Transceiver. A protocol for controlling radios.
Client	A computer or mobile device connected to RSS.
CSS	Cascading style sheets. Cascading style sheets are used to format the layout of Web pages. Used in RigPi.
CW, Element Based	Remote CW by sending the timing of CW elements (dits and dahs). This preserves your keying "personality".
CW, Character Based	Remote CW by sending ASCII characters (A, B...)
Download	Transfer data to a client, such as a PC, to RSS
GPIO	General Purpose Input Output, a connection used by the Raspberry Pi for controlling external devices.

Term	Definition
Hamlib	A radio and rotor library developed to facilitate control of ham equipment. Used in RigPi.
JavaScript	An object-oriented computer programming language commonly used to create interactive effects within web browsers. Used in RigPi.
jQuery	A concise and fast JavaScript library that can be used to simplify event handling, HTML document traversing. Used in RigPi.
LoTW	Logbook of the World, a service from ARRL that provides secure electronic QSO confirmations.
MariaDB	A community-developed fork of the MySQL relational database management system intended to remain free under the GNU GPL. Used in RigPi.
MOMR	Multiple-operator, multiple-radio, supported by RSS
MySQL	An Oracle-backed open source relational database management system (RDBMS) based on Structured Query Language (SQL)
PHP	PHP is a server scripting language, and a powerful tool for making dynamic and interactive Web pages. PHP is the acronym for PHP: Hypertext Preprocessor. (It originally meant "Personal Home Page.") Used in RigPi.
Port Forwarding	Providing a data path through a router so devices on a LAN can be accessed from the Internet.
Raspberry Pi	A small single-board computers developed in the United Kingdom by the Raspberry Pi Foundation
RSS	RigPi Station Server
Upload	Transfer data from a client, such as a PC, to RSS
TQSL	Trusted QSL provides secure transfer of logs to and from the Logbook of the World

Term	Definition
VoIP	Voice over IP, the technology used to provide 2-way audio to and from RSS for remote operations. RSS uses the free, open-source program Mumble to provide VoIP.

6.2 Installing the latest Hamlib

The Hamlib control library is constantly updated by the maintenance team. Hamlib must be updated in RigPi manually using these steps:

1. Open the Raspberry Pi Desktop
2. Open the browser by clicking the Globe in the toolbar.
3. Navigate to the Hamlib folder in Github to get the latest Beta version (you can also select the latest release version):

   https://github.com/Hamlib/Hamlib

4. Click the green Code button, then Download ZIP.
5. Right-click over the Hamlib-master.zip button at the bottom of the browser and select Show in folder.
6. In the Downloads folder right-click Hamlib-master.zip and select Extract here.
7. Close the Downloads folder and the browser.
8. Open Terminal by clicking the >_ black icon at the top of the Desktop.
9. Type these commands:

```
cd /home/pi/Downloads/Hamlib-master
./bootstrap
./configure
make
sudo make install
```

Let each command complete before entering the next command. The make process will take several minutes.

Once the make install command is complete you are good to go. Start RigPi and use Connect Radio.

If you installed the Hamlib to pick up a new radio, you need to add that radio to the RigPi radio database. To get the values for the list below, open Terminal and type the following:

```
rigctl -l
```

(lower-case L)

Look for the radio you want to add in the resulting list.

1. Start phpMyAdmin from the Raspberry Pi desktop app menu, Programming.
2. Use username mysql-user and password 7388.
3. Expand the station database by clicking the +.
4. Open the Radios table.
5. Click Insert, then add the following values:

OLDNUMBER	Hamlib ref number for this radio
NUMBER	Hamlib ref number for this radio
SAMEAS	Hamlib ref number for this radio
MANUFACTURER	Name
MODEL	Model number
VERSION	Hamlib version for this radio
STATUS	Hamlib status

Click Go at the bottom left and close phpMyadmin. The newly added radio appears in the Radio list in Advanced Radio settings.

6.3 Panels

The Graphics User Interface (GUI) used in the RSS Tuner window is based on a commercial product "Perfect Widgets" by Perpetuum Software. The Frequency, S-meter and Tuning Knob panels use HTML5 JSON technology to provide a modern look. This is proprietary software.

Perfect Widgets site

It is possible to modify RSS code to set your own values in each panel. By means of an online inspector, you can see the tree structure of the respective JSON object.

JSON code inspector

The Perfect Widgets development tools are proprietary. The RSS panels are developed using a "Developer's License." A limited free version of Perfect Wiglets is available on the Perpetuum web site.

Perfect Widgets 2.0

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Last modified on September 07, 2012.

6.4 Programming

The following languages and tools were used in the development of RigPi.

Programming Languages

The following languages are used in RSS. They are all free tools with widespread support on the Internet.

- CSS
- HTML5
- Bootstrap4
- PHP7
- JavaScript/jQuery
- AJAX
- MySQL/MariaDB
- TCP API for controlling RSS
- Python 3

Programming Tools

I used the following tools while developing RigPi. I have no relationship with the authors of any of these applications.

FileZilla

FileZilla is a free client program for ftp file transfers. It is available for most platforms including Windows and Mac OS X/macOS.

Here is the link for further information about FileZilla:

FileZilla

phpMyAdmin

phpMyAdmin is used for editing, modifying, and backing up MySQL databases. It is installed on RigPi. Access phpMyAdmin through a browser:

http://rigpi4.local/phpmyadmin

Username is mysql-user, password 7388. These must be changed if you open RigPi to the Internet.

Here is the link for further information about phpMyAdmin:

phpMyAdmin site

Nova

Available for the Mac, Nova (previously named Coda) by Panic Inc. is a powerful text editor, previewer and file manager. It is a commercial product, not free.

Here is the link for further information about Coda:

Nova site

Perfect Widgets

A tool to create dynamic HTML5 gauges. Designed for Windows. It is a commercial product although there is a free personal/non-commercial version.

Here is the link for further information about Perfect Widgets:

Perfect Widgets site

Help+Manual

Help+Manual is a commercial program to write and publish Help files using Windows.

Here is the link for further information about Help+Manual:

Help+Manual site

Safari with Developer extensions

Developer tools, especially the JavaScript console, are provided with Safari.

6.5 Raspberry Pi Settings

You may wish to change many Raspberry Pi settings such as screen resolution. There are two ways to proceed:

1. From the Raspberry Pi Desktop, click the Menu button (raspberry) at the top left. Select Preferences>Raspberry Pi Configuration or >Screen Appearance, or,
2. From Terminal, enter
   sudo raspi-config

It is normal to have items missing in the raspi-config window. If they no longer apply in the operating system in use, they are omitted from the list.

6.6 Rebooting RigPi

Occasionally it is necessary to reboot RigPi. There are several ways to proceed.

RigPi: Go to Settings->System and click Reboot RigPi.
Desktop: From the App Menu, click Log Out, then Reboot.
Terminal: Enter <sudo reboot> and click Enter.

The login screen opens. Enter your username/password and click Login after RigPi boots.

If using a Keyer board, the Keyer sends 'R' as it is powered on.

The boot takes less than a minute. The green status light on RigPi blinks as data are transferred.

6.7 Resetting RigPi

If you want to sell your RigPi in the future there are a few steps you should take to make it easier for the new user.

The RigPi login credentials can be reset to the factory defaults by following these steps:

1. Start phpMyAdmin from the Raspberry Pi applications menu>Programming
2. Sign in with username mysql-user and password 7388.
3. Expand the station Table list by clicking the + mark.
4. Select the Users table.
5. Click Edit at the left end of the data line.
6. Enter the following to restore the Admin user account to default:
   a. Access_level: 1
   b. MyCall: ADMIN

c. Username: admin
d. Password: delete so field is blank
7. Scroll to the bottom and click Go.
8. Exit phpMyadmin

You should now be able to log in with username admin and no password.

Use the RigPi>SETTINGS>Users window to remove all but the ADMIN account.

In RigPi>SETTINGS>Advanced Radio change the radio to Hamlib Dummy and set all the fields to "default."

6.8 Rigpi4.local on Windows computers

The domain rigpi4.local can be used as an easy way to connect to RigPi using a browser on another computer. Many operating systems automatically support the use of .local addresses with the exception of Windows. Bonjour may already be installed on your Windows computer, especially if you have installed Apple iTunes in the past.

Apple Bonjour, one popular way to add .local support to Windows is available as a free download from Apple. Search for Bonjour for Windows and you will find the site providing the download. Except for Microsoft Edge, most browsers will open RigPi using rigpi4.local once Bonjour has been installed.

If you are using Microsoft Edge, a program called Fiddle can be run at the same time as Edge so the .local addresses will work. Here is a link to the Fiddler download site:

Fiddler

To start Fiddler, use the Search function in Taskbar to find fiddler. Then right-click and select Run as Administrator. Once Fiddler is running, navigate to rigpi4.local in Edge.

6.9 RigPi Audio Update

Early versions of RigPi used a settings file named audioinjector-wm8731-audio for the RigPi Audio board. If you don't have a RigPi Audio board installed in your RigPi, it is not necessary to proceed with the recommended changes.

If you have one of the early RigPi servers, follow the steps below to update. Right-click Speaker icon on the Raspberry Pi Speaker icon. If the drop down list includes "audioinjector," it is strongly recommended you proceed with this change. If the list already includes snd_rpi_proto, please confirm the audio settings steps below for Audio Device Settings. Even if

you are using your radio's CODECs to provide input and output audio, it is best to make these change for the RigPi Audio board.

This topic also includes information on how to change audio levels and switches in Raspberry Pi settings for the new overlay.

This update changes a file called a “device tree overlay” to a new one that is better suited for the RigPi Audio board. The new overlay provides significant improvements for the decoding of FT8 signals in WSJT-X and Mumble audio quality for weak signals.

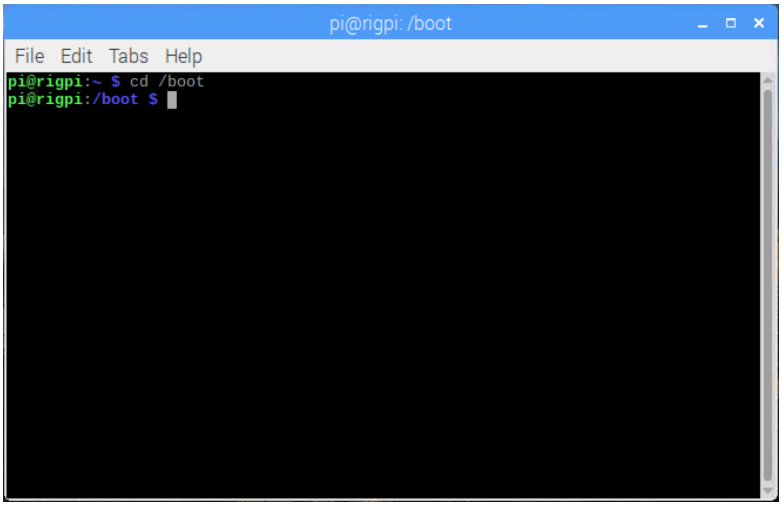
Because this change requires elevated file access permissions it will be done manually. A file will be edited from the Raspberry Pi Desktop.

Open the Raspberry Pi Desktop by:

1. Attaching an HDMI Monitor (micro HDMI for Raspberry Pi 4B), USB mouse and USB keyboard to RigPi, or….

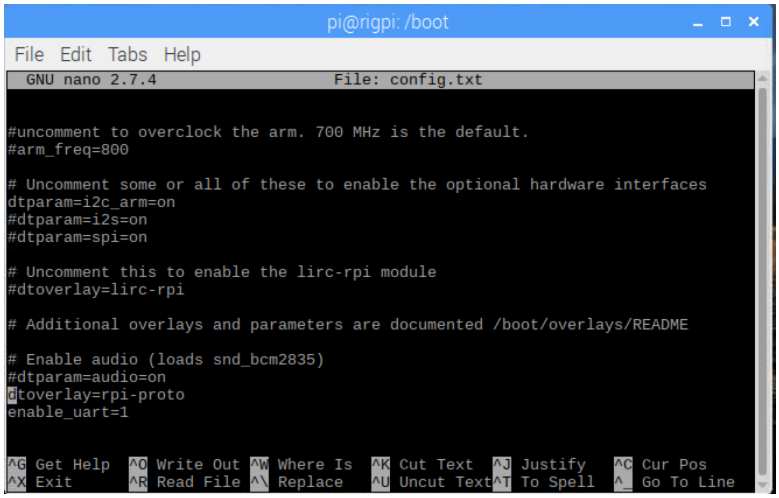
2. Using VNC Viewer from another computer to open the Raspberry Pi Desktop in a virtual window.

Start Terminal by single-clicking the black icon in the Desktop toolbar. Enter the following commands:



```
cd / boot <Ent er >
sudo nano conf i g. t xt <Ent er >
```

Scroll to the end of the config.txt file using the down arrow key.
Replace the second to last line (containing audioinjector-wm8731-audio) with this:




```
dt over l ay=r pi - pr ot o
```

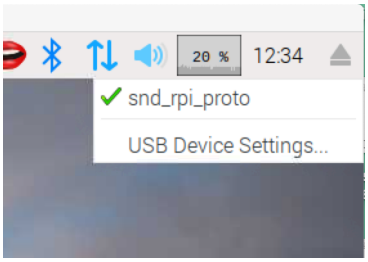
Save and exit

```
Ct r l +o<Ent er >
Ct r l +x<Ent er >
```

Reboot using

```
sudo r eboot now<Ent er >
```

to have the change recognized.



After rebooting, Right-click on the Speaker icon at the top right-hand end of the Desktop and select snd_rpi_proto for the following steps.

We will now use the Raspberry Pi Audio Device Settings to set levels and input/output connections.

Click the Raspberry Applications Menu icon in the top left corner of the Raspberry Pi Desktop, then select Preferences>Audio Device Settings.

- Confirm that Card: snd_rpi_proto (Alsa mixer) is the selected card.
- Use these settings for using the Mic or Line Input and Line Output. If the audio levels are too low, use the Mic settings in the Options tab.

Audio Device Settings, Selections:

Click the Select Controls... button at the bottom. Put checks in the following options:

1. Master
2. Line In
3. Microphone
4. Mic Boost
5. Capture
6. Input MUX
7. Output Mixer HiFi

Audio Device Settings, Levels and options:

Control	Value	Notes
Playback		
Master	2/3 maximum	change to suit
Mic Boost	Maximum	change to suit
Capture		
Capture	2/3 maximum	change to suit
Switches		

Control	Value	Notes
Line-in	checked	
Microphone	Checked	
Output Mixer HiFi	Checked	
Options		
Input Mux	Line In	Select Mic for low level audio input

Finally, click the Make Default button at the bottom and close the Audio Devices Settings.

After testing with your transceiver you may find it necessary to change some of the Audio Device Settings window options and levels.

Other settings

Any program that uses audio from RigPi Audio, a radio CODEC, or an external USB sound card should be set to [default] for input and output devices except for Mumble. The default is set by using the Speaker right-click menu.

If you wish to use a digital mode program (Fldigi, JT8Call, WSJT-X) use [default] for all audio input and output devices.

In Mumble client, use [sysdefault:CARD=sndrpiproto] snd_rpi_proto, Default Audio Device if using the RigPi Audio board. If using a radio CODEC, use [default].

6.10 RigPi Keyer PTT

The WinKeyer IC used for CW keying has an independent PTT capability that can control the PTT output from RigPi Keyer. This special Keyer PTT operates in parallel with the normal RigPi PTT. To use RigPi Keyer PTT, the Keyer must be assigned to the account for which you want to use it.

RigPi PTT, configured in Radio settings, controls the PTT jacks on both boards, RigPi Keyer and RigPi Audio. Keyer PTT also controls the PTT line on RigPi Keyer, no matter whether RigPi PTT is on or not. Keyer PTT can be used to control an external device, such as a remote power switch or an antenna bypass switch.

Keyer PTT is controlled by custom macros. Two macros are pre-programmed in the RigPi Macro bank to accomplish this: SWITCH ON ($<18><01>) and SWITCH OFF ($<18><00>). In SETTINGS>Keyer, remove the check from Enable Keyer PTT to switch to independent control using Macros.

RigPi PTT	Macro Switch	Audio PTT Out	Keyer PTT Out
On	On	On	On
On	Off	On	On (Off with jumper 201 removed)
Off	On	Off	On
Off	Off	Off	Off

RigPi PTT (Radio Settings) has 3 options: None, ON when transmitting, and ON when radio connected. This third option overrides Key PTT since it is on whenever the radio is connected. Keyer PTT and Audio PTT are both on continuously. If RigPi PTT is set to None, Audio PTT never turns On, and Keyer PTT is controlled by the Macros. By removing jumper 201 on the RigPi Keyer board, RigPi PTT has no control over the Keyer PTT.

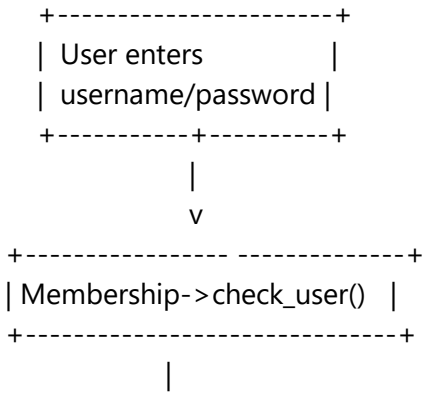
The Keyer PTT can be used to control an external power switch. Candidate power switches include:

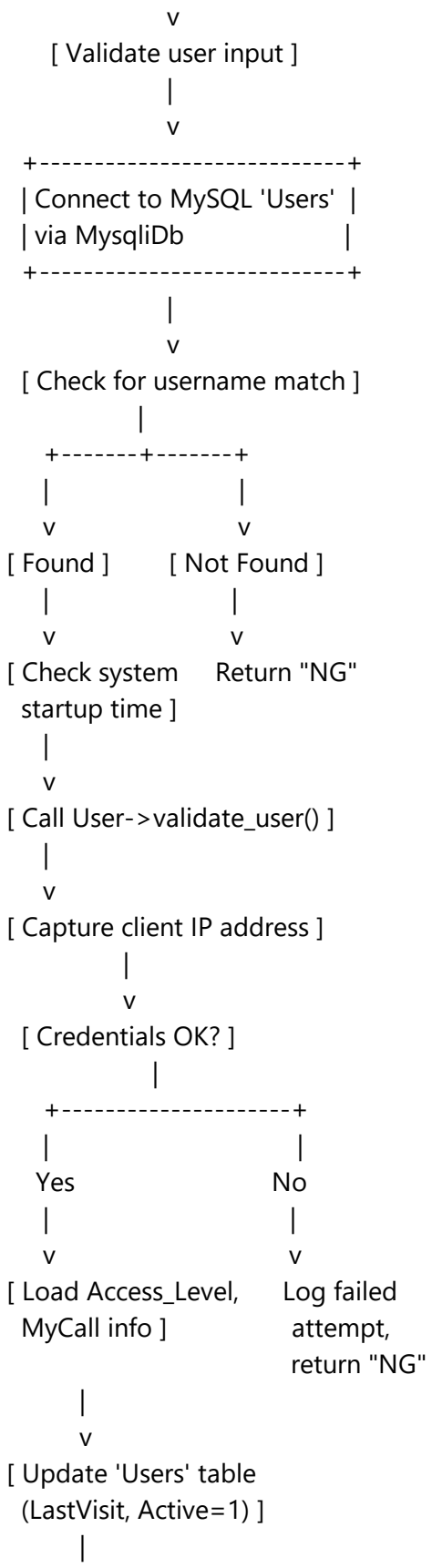
MFJ-1172 (discontinued)

Digital Loggers IoT Control Relay

6.11 RigPi Login Code

RigPi requires a unique username for each account. Passwords are optional, but are recommended if you wish to use RigPi through the Internet. The diagram below shows the logic flow as you log in.





```
          v
[ Add new record in
  'LoggedIn' table ]
          |
          v
[ Set session variables ]
          |
          v
[ Write success to rigpi-access.log ]
                |
                v
[ Redirect:
  ADMIN → wizardUser.php
  Level>9 → ptt_only.php
  All others → index.php ]
```

6.12 RigPi Remote Keyer

See also: Keyer 82 Advanced Radio 116

The RigPi Remote Keyer feature allows you to operate CW from a remote location using a paddle, bug or straight key. A RigPi with a modified Keyer board is required for early RigPi's) at both ends (see schematic, below). One of several keying options can be used at the remote end:

At radio end:

1. Radio RigPi1-4
   A. RigPi 4 software

B. Raspberry Pi 3B+ or 4B
C. Audio Board or CODEC (for VoIP) and CW Board

At remote key end (2 options):

1. RigPi 1-4 (same as radio end)

Or

2. RigPi Hub Windows program
   A. RigPi Hub 2.4.0 or later
   B. Control the radio through RigPi Hub with your favorite logging program
   C. Send CW from most logging programs, straight key, keyboard key or mouse button, or electronic key
   D. Requires Windows Mumble client for VoIP

A RigPi Keyer can serve one of four functions as determined by the Keyer Fn in SETTINGS->Keyer. See below the table for examples.

Keyer Function	Keying	Note
Normal One RigPi with keying capability.	Key your transmitter from any browser using Tuner macros, the Keyer window, or from RigPi Hub.	A Windows keying program using RigPi Hub 2.4 (or later) for keying. In RigPi Hub, set the RigPi IP, RigPi Control Port to 3000n, and CW Port to 3000n where n is the account number.
Remote/Radio Keyer Manual Keying Two RigPi's, each with modified Keyer board	Requires two RigPi's, each with a Keyer board. Connect your paddle, bug, straight key, or RigPi Hub to the Remote RigPi . The Remote RigPi controls the Radio RigPi. See Getting Started with Two RigPi's, below.	A Windows keying program can be connected to the Radio RigPi using RigPi Hub 2.4 for keying in lieu of a Remote RigPi. Set the CW port, 30039 + n, when n is the account number. which is used for Radio Keyer data. Set the IP address for the

		Radio Keyer RigPi in Remote Keyer settings. Use the RigPi Radio LAN IP (when at home) or the RigPi Radio WAN IP (when away). If using a bug or straight key, connect the key using the tip and sleeve of the PADDLE connector. Use Vibrobug in the Radio RigPi SETTINGS->Keyer->Paddle Md. Use Remote Keyer at the Remote end and Radio Keyer at the Radio end in SETTINGS->Keyer->Keyer Fn.
External CTS, Manual Keying One Radio RigPi with Keyer board. No Remote.	Key CW from an external keying source connected to the CTS connection on a serial-to-USB adapter. Connect the RTS pin to the transmitter keying jack (through an appropriate interface circuit). See below for more about adapters. Remote keying is not supported.	Set External CTS in RigPi Advanced (Keyer) and Keyer settings (Keyer Fn). Select the USB adapter in SETTINGS->Advanced Settings->Keyer Port. Use Radio Keyer in SETTINGS->Keyer->Keyer Fn.
Direct IP Connection (not needed as a separate	Requires two RigPi's, or RigPi Hub at Remote, with a Keyer at the radio end. Enter the <Radio RigPi LAN>:<port> or <WAN IP>:<port> in the Remote Advanced Settings->Keyer Port OR Remote RigPi SETTINGS->Keyer Settings->Rad Port and Radio IP	RigPi Hub running under Windows can be used in place of a second RigPi. For that option you can use

function in the Keyer Fn list) Keyer required at Radio end, optional at Remote end.	boxes. If a Windows logging program you are using supports using an IP for WinKeyer keying, you can use that program rather than a Remote RigPi or RigPi Hub. If you have a Keyer at the remote end, the Keyer Settings option provides a sidetone. You will not get a sidetone if you use the Advanced Radio option.	the RigPi Hub sidetone or the radio's Mon function (if supported in your radio) to provide a sidetone.

Getting Started with Two RigPi's

Confirm that the RigPi Keyer is working correctly in each RigPi using the Normal Keyer function. If using two RigPi's on the same local network, use the IP address for each RigPi rather than the domain name. You can change the domain name in one RigPi using sudo raspi-config in a terminal on that RigPi. Change it to something like "radio.local' or 'remote.local'.

Radio Keyer

- Start the Radio RigPi in any browser.
- In Settings>Advanced Radio enter the settings for your radio.
- Select RigPi Keyer in the Key list.
- In Settings>Keyer, set the Keyer Fn to Normal and put a check in the Enable Sidetone check box.
- Connect a cable from the RigPi KEY connector to the CW keying jack on your radio.
- Click Connect Radio on the Tuner window. The frequency shown should be the same as shown on the radio.
- Click Test Keyer in the Keyer Settings window. You will hear two Morse V characters indicating the Keyer is functioning correctly.
- Connect a Keyer paddle to the PADDLE connector, open the Keyer window and send a few characters. If you wish to use a Bug or straight key, connect it between tip and sleeve on the connector and set the Paddle Md to Vibrobug.
- The Radio Keyer is now set for the Normal mode.

Remote Keyer

- RigPi is running using rigpi4.local on the Radio and Remote RigPi's. This will cause a conflict when both are connected to the same LAN. To resolve this conflict, open the Raspberry Pi desktop. Go to Menu>Preferences>Raspberry Pi Configuration. Enter rigpi4R.local in the Hostname, click OK, and give permission to reboot. From now on you can access the Remote RigPi by using rigpi4R.local.

- Start the Remote RigPi in any browser.
- In Settings>Advanced Radio select the Hamlib>Dummy radio.
- Select RigPi Keyer in the Key list.
- In Settings>Keyer, set the Keyer Fn to Normal and put a check in the Enable Sidetone check box.
- Click Connect Radio in the Tuner window. The frequency shown should be 145.000.000 MHz.
- Click Test Keyer in Settings>Keyer. You will hear two Morse V characters indicating the Keyer is functioning correctly.
- Connect a Keyer paddle to the PADDLE connector, open the Keyer window and send a few characters. If you wish to use a Bug or straight key, connect it between tip and sleeve on the connector and set the Paddle Md to Vibrobug.

Setting up Remote Keying with Two RigPi's

Once both keyers are working using the Normal function, we will set up the remote keyer connection through your local network. A dedicated port 30040 (default, use 30039 + account number) is used for the CW data.

Radio RigPi Keyer

- In Settings>Keyer select Radio Keyer in the Keyer Fn list.
- Settings>Keyer, enter a port in the Port box (30040 is recommended, must be the same as used in Remote Keyer).
- Click Test Keyer to register the new settings.
- In Tuner, click Disconnect Radio and Connect Radio to start the Radio Keyer function with the new settings.

Remote RigPi Keyer

- In Settings>Keyer select Remote Keyer in the Keyer Fn list.
- In Settings>Keyer, enter a port in the Port box (30040 is recommended).
- Enter the Radio RigPi LAN (or WAN) IP in the IP box.
- Click Test Keyer to register the new settings.
- In Tuner, click Disconnect Radio and Connect Radio to start the Remote Keyer function with the new settings.

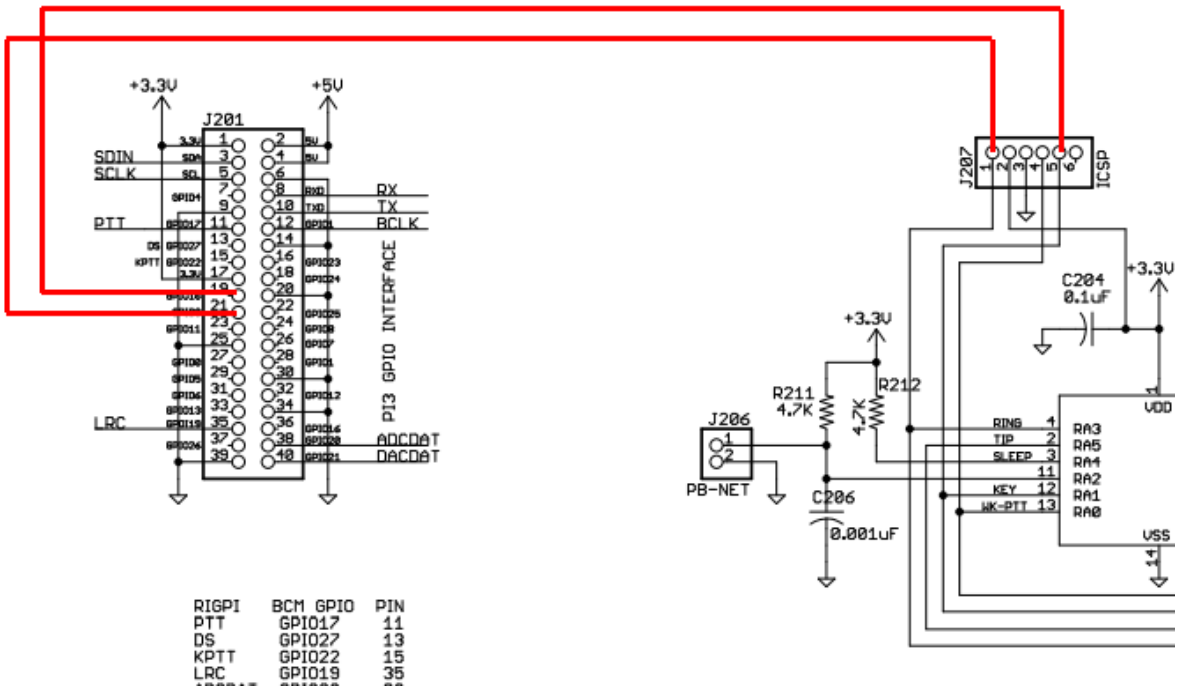
You are all set for Remote CW. Tune your radio to the CW portion of a band and turn on VOX. With the Keyer window open on the Remote Keyer RigPi, try sending some characters. You will hear the sidetone on both keyers and your radio should transmit.

Note the following:

- If running Remote and Radio RigPi near each other, turn off the Radio Sidetone to hear the Remote RigPi Sidetone more easily.
- When using Remote RigPi away from home you must set up UDP port forwarding for the port you have assigned (30040).
- When using Remote RigPi away from home you must use the WAN IP instead of the Radio RigPi LAN IP.
- To control your radio, open any browser at the remote location and connect to rigpi4.local. Port 80 must be forwarded to connect through your router if you are away from home. Use the WAN IP address of your Internet connection to connect.

RigPi Keyer Board Modifications

Two jumpers must be added to the RigPi Keyer board to allow remote keying, see below. This only applies to early production RigPi 1 Keyer boards. The jumpers have been added to later boards.



Remote Keying from a Windows Computer

Remote CW can be keyed from most Windows logging programs through a RTS or DTR keying input to RigPi Hub, or through WinKeyer compatibility. RigPi Hub 2+ is a Windows Virtual Port program that can control RigPi from up to 4 Windows programs. It is available for free from the RigPi web site: https://rigpi.net

Morse Keyer is a Windows programs that can connect to RigPi Hub. Using Morse Keyer you can send CW through RigPi Hub to a radio using a straight key, paddle, bug or even mouse buttons. A sidetone is provided in RigPi Hub. Select a free port in RigPi Hub, open it, then connect Morse Keyer to that port.

You can use a decommissioned mouse to connect to a physical key using *Morse Keyer*. It is possible to connect two mice to a computer although they control the same mouse pointer. The downside to this approach is that you must move the mouse pointer over the "keypad" on the *Morse Keyer* window to send using a key using the re-purposed mouse. Select a free port in RigPi Hub, open it, then connect *Morse Keyer* to that port.

Using two USB-to-serial adapter cables you can key *Morse Keyer* through a USB port and thence key RigPi Hub. See the *Morse Keyer* web Help page for details on connecting your key to Morse Keyer using a USB/serial connection.

https://morse-rss-news.sourceforge.net/

RigPi Hub can use a physical serial port in addition to virtual ports. Jumper the keying output from Morse Keyer (pin 4 on a DB-9 connector) to the CTS input on the second cable. See RigPi Hub Help for details.

Using remote CW with RigPi Hub

RigPi Hub 2+ can be used with RigPi to send CW from a Windows program through a virtual port. Two ways to send CW are provided with RigPi Hub: element based (key-down and key up times for each element are sent); character based (ASCII characters are sent to RigPi where they are converted to CW).

Element based keying

Element based keying requires a second port (in addition to a radio control port) for keying purposes. Note there is a delay keying the radio. This delay allows the key-down lengths to be faithfully produced for each character. RigPi Hub uses adaptive timing to watch for word spaces. When a word space is recognized, RigPi Hub sends the keying data to RigPi for that character.

The default port for element based keying in 30040 (for account 1, use 30041 for account 2, and so on). You must use a RigPi Keyer board at the radio end, set up for Radio Keyer in SETTINGS->Keyer->Keyer Fn. Open port 30040 for UDP in your router when operating away from home.

In addition to a manual keyer or logging program, here are additional ways you can key using RigPi Hub:

- Click the Key button on RigPi Hub with your mouse
- Press the "=" key on your keyboard (upper right on the keyboard)
- Press the "`" key on your keyboard (upper left on the keyboard)

Configure your program to use DTR or CTS for transmitting CW. Assign a RigPi Hub virtual port to the CW keying function of the external program.

The following programs have been tested using element based CW:

CommCat (discontinued)
Ham Radio Deluxe/Digital Master
N1MM
DXLog
Morse Keyer

RigPi Hub can connect to a physical port for keying from an external device such as an electronic keyer, straight key or bug. Select the serial port you want to use in the CW group and click Connect.

You can use a USB-to-serial adapter to gain access to the RTS, DTR and CTS control lines.

The CWMorse MY-KEY-SERIAL2 USB to key interface contains the interface circuits to transmit and key Morse code.

KC9ON Order Link

Because of its width, use a short extension cable so other USB ports won't be blocked. Here is one I use:

Amazon link

Here is another adapter I have tested. It works well by grounding the CTS line using an external key.

Amazon link

Character based keying

Character based keying does not require a separate port, it uses the standard RigPi Hub CAT port 30001. Port 3001 assumes you are using RigPi Account 1. Use port 30002 for account 2 and so on.

Send CW from one of several popular logging programs. The program must support Winkeyer-compatible keying. Set up a RigPi virtual port for this purpose at 1200 Baud. Connect to this port from the Winkeyer interface in the program you are using.

The following programs have been tested using character based CW:

CommCat (discontinued)
Ham Radio Deluxe/Digital Master
N1MM

WK3 Demo by K1EL

Ham Radio Deluxe (character mode)

Confirm that CW is working in RigPi. No special RigPi settings are required to use character mode remote CW.

Start RigPi Hub and set up one virtual port for radio control at 38400 Baud and a second virtual port for CW at 1200 Baud.

Start Ham Radio Deluxe using a Kenwood TS-2000 radio selection. Start DM780.

In DM780 Modes, select CW (WinKey).

In Winkey->Keyer settings, select the port you configured for 1200 Baud. Click Connect.

In DM780->Winkeyer->Speeds, remove the check in Track Changes, if there.

In DM780->Winkeyer->Keyer, click Test. The RigPi Keyer should send TEST DE DM. Close Winkeyer settings.

Use the CW functions in DM780 as you normally would. There is no sidetone when operating in this way. You can turn on your radio's sidetone and hear it through Mumble. The RigPi CW indicator in the lower right hand corner of the RigPi Hub window shows when CW is being sent.

N1MM (character mode)

Confirm that CW is working in RigPi. No special RigPi settings are required to use character mode remote CW.

Start RigPi Hub and set up one virtual port for radio control at 38400 Baud and a second virtual port for CW at 1200 Baud.

Start N1MM using a Kenwood TS-2000 radio selection.

In Config->Configure Ports, set up a separate port for WinKeyer. Put a check in the WinKey box.

In Config->Winkey, select Ignore Winkey Speed Pot.

In Winkey->Keyer settings, select the port you configured for 1200 Baud. Click Connect..

Use the CW functions in N1MM as you normally would. There is no sidetone when operating in this way. You can turn on your radio's sidetone and hear it through Mumble. The RigPi CW indicator in the lower right hand corner of the RigPi Hub window shows when CW is being sent.

K1EL WK3 Demo (character mode)

Confirm that CW is working in RigPi. No special RigPi settings are required to use character mode remote CW.

Start RigPi Hub and set up a virtual port for CW at 1200 Baud.

Start WK3 Demo..

In Setup->Com Port Settings, select the virtual port you set up for 1200 Baud. Click Done.

Click the Open button to initialize the keyer.

Use the CW functions in WK3 Demo as you normally would. There is no sidetone when operating in this way. You can turn on your radio's sidetone and hear it through Mumble. The RigPi CW indicator in the lower right hand corner of the RigPi Hub window shows when CW is being sent.

CommCat (character mode)

(Note: CommCat has been discontinued.)

Confirm that CW is working in RigPi. No special RigPi settings are required to use character mode remote CW.

Start RigPi Hub and set up one virtual port for radio control at 38400 Baud and a second virtual port for CW at 1200 Baud.

Start CommCat using a Kenwood TS-2000 radio selection.

In File->Settings->Radio/Ant->CW, select Winkeyer and the port you set up for 1200 Baud.

Use the CW functions in CommCat as you normally would. There is no sidetone when operating in this way. You can turn on your radio's sidetone and hear it through Mumble. The RigPi CW indicator in the lower right hand corner of the RigPi Hub window shows when CW is being sent.

Using the Radio Sidetone with Remote CW

Many radios provide a sidetone while sending CW. It may be possible to send the sidetone from the radio to the remote Mumble. For example, the Icom IC-7300 provides this capability. To enable sidetone through the audio CODEC, go to MENU->SET->Connectors->ACC/USB AF Beep/Speech... Output and set the option to ON. You will want to set the option to OFF for speech operation. For other radios, check your manual and menu settings to see if this is possible.

Examples

Connect Remote RigPi (rigpi4.local) Keyer to Radio RigPi (radio4.local) Keyer, local network, character keying.

If you are using the Remote RigPi on the same LAN as the Radio RigPi, to prevent conflicts change the Hostname for the Remote RigPi to something else such as remote.local. Do this by using the RaspBerry Pi desktop and opening Terminal. In Terminal type sudo raspi-config. Go to System Options->Hostname and follow the instructions.

Remote RigPi (account 1) (note you can use any accounts you wish by adjusting the Rad Port numbers):

Advanced Settings:

Keyer	RigPi Keyer
Keyer Port	/dev/ttyS0

Keyer Settings:

Keyer Fn	Remote Keyer	
Rad Port	30003	port for third account (30003)
Radio IP	172.16.0.62	Radio4.local Radio IP

Radio RigPi (account 3)

Advanced Settings:

Keyer	RigPi Keyer
Keyer Port	/dev/ttyS0

Keyer Settings:

Keyer Fn	Radio Keyer
Rad Port	30003

Connect USB CTS device, local network, element keying.

Radio RigPi (account 1):

Advanced Settings:
Keyer	Externl CTS
Keyer Port	/dev/serial/by-id/usb_USB_Serial-if00-port0 USB device

Keyer Settings:
Paddle Md	Vibrobug
Keyer Fn	Radio Keyer
Rad Port	Empty (Ignore)

Remote RigPi

Advanced Settings:
Keyer	N/A	No remote
Keyer Port	N/A	No remote

Keyer Settings:
Keyer Fn	N/A	No remote
Rad Port	N/A	No remote

Connect two RigPi's, local network, element keying.

Remote RigPi (account 1)

Advanced Settings:
Keyer	RigPi Keyer
Keyer Port	/dev/ttyS0

Keyer Settings:
Paddle Md	Vibrobug
Keyer Fn	Remote Keyer
Rad Port	30040 (acct 1) 30041 (acct2) ...

Radio RigPi (account 1):

Advanced Settings:
Keyer	RigPi Keyer
Keyer Port	/dev/ttyS0

Keyer Settings:
Paddle Md	Vibrobug
Keyer Fn	Radio Keyer
Rad Port	30040 (acct 1) 30041 (acct2) ...

6.13 Schematics

Schematics and additional information for the K1EL Winkeyer 2 are here.

Schematics for the MFJ RigPi Audio and RigPi Keyer boards can be downloaded through the following link:

MFJ RigPi Schematics

RigPi Audio Circuit Description

The MFJ RigPi Audio board is based on the Cirrus Logic WM8731 (U1) low power stereo Codec. It supports a stereo input and mono output. The left input and output channels are transformer isolated for hum reduction. Both stereo input channels are available for I/Q signal processing. This input path is not transformer isolated.

The WM8731 is controlled through the Raspberry Pi GPIO connector.

GPIO 1 (Pin 12) BCLK: Digital Au00io Bit Clock, Pull Down,
GPIO 19 (Pin 35) LRC: DAC Sample Rate Left/Right Clock
GPIO 20 (Pin 38) ADCDAT: Digital data out
GPIO 21 (Pin 40) DACDAT: Digital data in
SDA (Pin 3) SDIN: 3-Wire MPU Data Input / 2-Wire MPU Data Input
SCL (pin 5) SCLK: 3-Wire MPU Clock Input / 2-Wire MPU Clock Input

The WM8731 can convert input data with up to a 96kb sample rate.

Additional GPIO pins used for RigPi Audio:

GPIO 17 (Pin 11): PTT

Connectors:

J1: Raspberry Pi GPIO connector
J2: 3.5 mm jack for I/Q input (stereo, unisolated)
J3: 3.5 mm jack for left channel audio input (tip, transformer isolated)
J4: 3.5 mm jack for audio (tip), PTT (ring), and KX3 (ring) power on signal
J5: Connector to route audio to the RigPi jumper board

Jumpers:

JP2: Audio In selection (1-2 for stereo -no transformer isolation-, 2-3 for left mono -transformer isolated- input)

RigPi Keyer Circuit Description

The K1EL WinKeyer3 CW Keyer IC provides all of the programming for its many features. The keyer is controlled through the internal serial port on the Raspberry Pi, ttyS0.

RXD (Pin 8): Receive data (from keyer)
TXD (Pin 10): Transmit data (to keyer)

Connectors:

J201: Raspberry Pi GPIO connector
J202: 3.5 mm jack, PTT out (tip is PTT, ring is 5V pull-up)
J203: 3.5 mm jack, Paddle input (tip is DOT, ring is DASH)
J204: 3.5 mm keying output (tip keys, ring not used)
J205: speaker connection
J206: PB-NET (allows external switches to play back internal memory, not used)
J207: Programming connector, not used

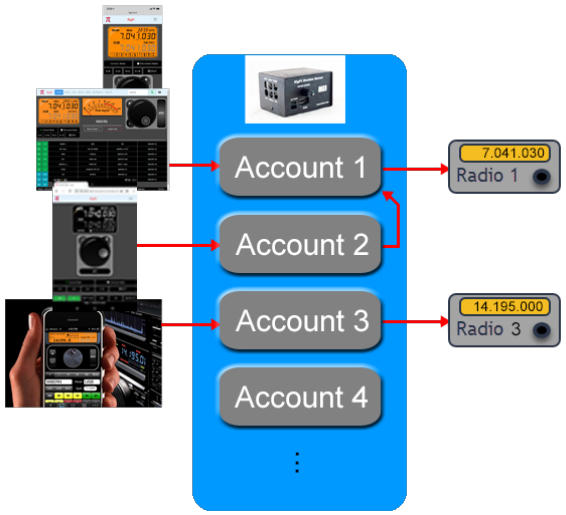
Jumpers:

JP201: PTT enable (1-2 enables GPIO PTT, otherwise, GPIO PTT not used)

GPIO pins used for RigPi Keyer:

GPIO 9 (Pin 21): Data to radio keyer (only used at remote end)
GPIO 10 (Pin 19): Data from remote keyer (only used at radio end)
GPIO 17 (Pin 11): PTT
RXD (Pin 8): Receive data from keyer chip
TXD: (Pin 10): Transmit data to keyer chip

6.14 Sharing Radios, Rotors and Keyers



Radio

RSS allows multiple radios to be connected, controlled and shared. Each radio is connected through a unique USB port on the Raspberry Pi. One rig can be assigned to each account. Another account can share the same radio, but the connection is slightly different. One RigPi can be linked 60 to another RigPi.

There are two ways to share a radio in use in another account.

1. Open a new browser window and sign in using the radio-controlling account's username and password. The keyer and rotor assigned to the main account are available in newly opened browsers connected to the same account. See Account 3, above.

   Note there are two connections, long and short, listed for each radio in R Port. The long form is best since it does not change when you reboot. You can't use the long form and short form at the same time for different accounts or programs or they will conflict.

2. Instead of a physical radio and USB port as with option 1, above, (ttyUSBn), in Settings>Basic or Advanced Radio for the second account, select Hamlib and Net rigctl as the manufacturer and radio. In R Port, select the port number for the account's Radio you want to use. Port numbers start with 4532 for Radio 1, and go up 2 for each Radio number. Radio 2 will be 4534, etc. So if account 2 wants to use the radio already connected in account 1, select 4534 from the port number list. You can also see the rigctl port to use in SETTINGS>System>Rigctl Port for the account connected to the physical radio. When you select Net rigctl, the R Port list shows the valid ports for all connected radios.

The radio in Account 1 must be turned on and connected. See figure above. Account 2 taps into the control data stream used for Account 1. Account 2 can control the radio, but it can't turn the Account 1 radio on or off. You can add additional accounts for other users so each user has his/her own settings and log in credentials..

Use option 2, above, if you wish to use Hamlib in another program, and connect RSS to the same radio. Fldigi and WSJT-X, provided with RSS, can be the primary rig control program. Once Fldigi/WSJT-X are running and in control of the radio, connect RSS to Hamlib Net rigctl with the same port, usually 4532, used by the other program.

You can do it the other way around with RSS being the radio-controlling program. Set up Fldigi or WSJT-X so they follow RSS by using Hamlib Net rigctl in the other program with the port number as above.

Rotors

Each account has a unique rotor. If you have more than one rotor but only one radio, you can set up a second account using Option 2, above, and assign the second rotor to that account. Rotors use a port one above the radio port. If the radio port is 4532, the rotor port is 4533.

Keyers

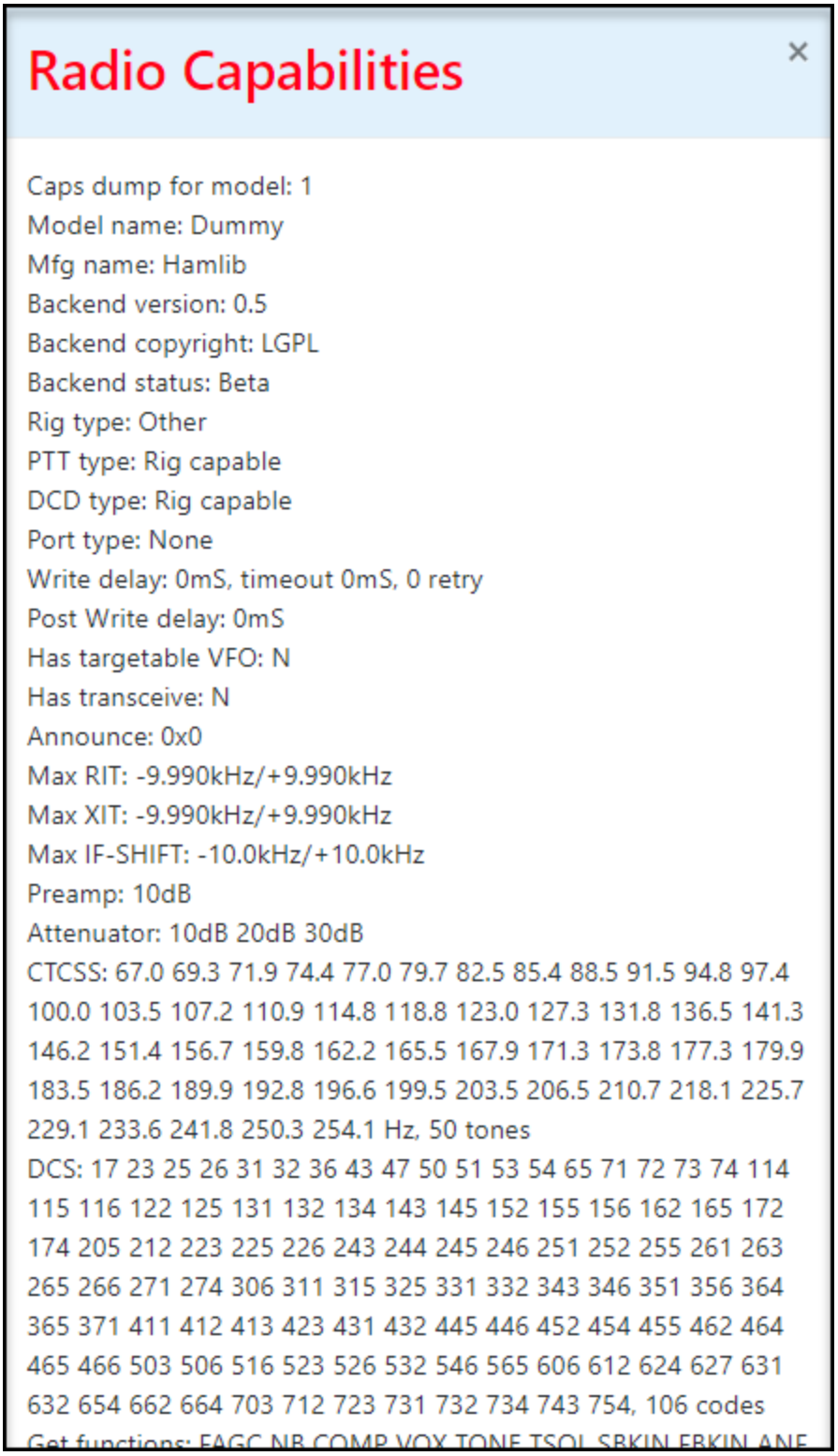
RSS supports the internal RigPi Keyer, keying through radio CAT commands, and external K1EL WinKeyers.

Only one account can use RigPi Keyer. If you log into that account with a second or third browser (option 1, above), the assigned keyer will do fine. If you have an account for a second or third radio, use CW keying via CAT, or use an external WinKeyer connected through a USB port.

CAT CW Keying does not echo characters back to RSS so the Transmitted CW box in the Keyer window will remain blank. Not all prosign CW characters are accepted by CAT Keying.

6.15 Supported Radio Features

Hamlib supports over 200 radios. Not all controllable features are supported. Custom macros can be created using Hamlib commands, but only if that particular feature is supported. You can also use the special "w" Hamlib command in a macro to send native commands directly to a radio, but even this approach may not be supported for a particular command.



Go to RigPi SETTINGS>Radio>Advanced and use the Radio Capabilities button to show a list of all features for the selected radio supported by Hamlib.

The Hamlib library is in a constant state of improvement and enhancement. New radios are frequently added. Here is a link to the Hamlib forum where these developments are discussed:

Hamlib Forum

6.16 System

Swap Space

Swap space is memory used when the system runs out of RAM. Usually the Linux Swap Space is not used in RSS. Many programs requiring compiling (such as Fldigi) require at least a 512 MB swap space. Using swap space when not necessary can reduce the life of an SD card. See this link for further details on managing Swap Space:

Swap info

Backing up and Upgrading the RigPi Memory Card

The Micro SD memory card for the Raspberry Pi has a limited lifetime. Write cycles are usually more critical in determining the life of an memory card because the space to be taken by a write must be cleared first. 'Wear leveling' is used to distribute write cycles so one portion of the memory space is not used constantly. It is suggested that you use a memory card having at least two times the space needed to leave room for wear leveling.

To provide insurance against a corrupted memory card, it is wise to back it up to a second card, a USB memory stick, or as an image to a fixed drive. The simplest way to back up the SD Card is by using the SD Card Copier program available through the Accessories menu on the RSS Desktop.

The SD Card can be backed up to a USB memory stick or to another SD Card. The latter requires a spare card and SD Card USB adapter. Plug the USB stick or adapter into a spare USB connector on RSS.

Select the Raspberry icon to open the Applications Menu. Select Accessories, then SD Card Copier. Follow the instructions given in SD Card Copier Help.

Minimum microSD Card specifications:

Type: Micro SD
Size: 32GB (or larger)
Class: 10

Speed: 80MB/s or faster

RigPi makes intensive use of the memory card. Cards designed for video applications are able to handle large amount of data with continuous recording. Manufacturers claim up 43,800 hours (5 years) endurance. The Samsung PRO Endurance 32 GB card is one recommended upgrade for RigPi.

Optimal microSD Card specifications:

Type: microSDXC
Size: 32 GB (or larger)
Class: --
Speed: 100/30 MB/s

External SSD (Solid State Drive)

RigPi performance can be significantly improved by using an external SSD rather than a memory card. Users report up to 3-4 times improvement using this option. Here is an article on the *QSO Shack* web site that describes how to install and use an SSD with RigPi:

https://www.qsoshack.com/upgrade-the-mfj1234-rigpi-with-an-ssd-and-pi4/

Providing more space on the Memory Card

Here are some suggestions for increasing the free space on your memory card.

- Make sure all of your memory card is being used. This is especially important if you are moving to a larger memory card.

    1. Open Terminal from the Raspberry Pi desktop
    2. sudo raspi-config
    3. Select the Advanced option
    4. Expand memory space

- Transfer RigPi to a larger microSD card. See the previous section, Backing Up and Upgrading the RigPi Memory Card. Be sure to expand the memory space as described above.
- Logs are rotated and deleted by the Logrotate utility. Logrotate is configured in the file /etc/logrotate.conf.

Updating the Raspberry Pi Operating System

Updates to the Raspbian operating system occur often. To keep current, RigPi has an automatic update feature that updates your system in the background once per week. You can also update manually using these commands in Terminal:

Update system package list cache: sudo apt update

Upgrade software: sudo apt full-upgrade

Reboot RSS to apply the changes: sudo reboot

6.17 Troubleshooting

Radio won't connect

When you try to connect a radio by using the Connect Radio button and the connection fails, take a close look at the error message to get clues. The normal failure is "Connection Refused" with a suggestion to check settings.

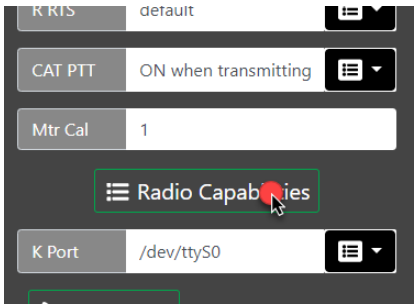
First verify that the radio is on and the USB cable associated with that radio is plugged in to RSS. Check the Port option in SETTINGS>Radio to make sure the radio com port is in the drop-down list.

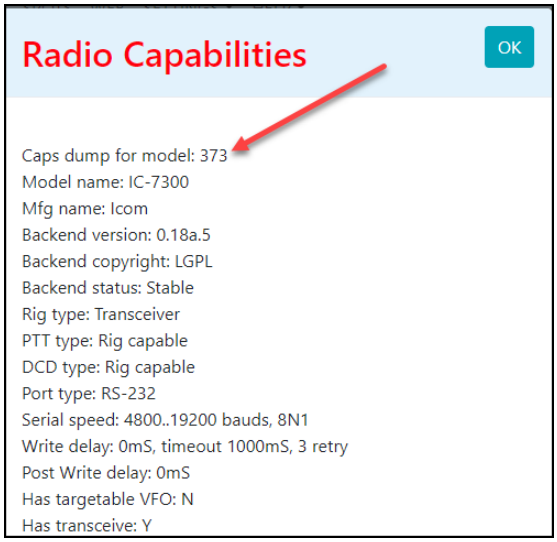
Try rebooting RSS from SETTINGS>System>Reboot RigPi to see if that fixes it.

The Connect Radio and Disconnect Radio buttons on the Tuner window require the radio to be set up in SETTINGS>Radio first. If it hasn't been set up, RSS won't be able to connect. (RigPi is initially configured with a "dummy" radio simulation so you can use Connect Radio with no further setting changes required.)

If you have more than one USB device connected to RSS (several radios, rotor controls or an external WinKeyer), the port assigned to each cable can change when you reboot. What was /dev/ttyUSB0 connected to radio A may now be connected to radio B, and radio A is /dev/ttyUSB1 after a reboot. In SETTINGS>Radio>Port it is best to use the long port name form each device. The long port names do not change after a reboot.

Next try starting the rig connection manually. This requires the use of the Raspberry Pi Desktop Terminal. The manual connection uses the Hamlib model number for your radio. In SETTINGS>Advanced Radio click the Radio Capabilities button.





At the top you will see 'Caps dump for model: xxx,' where xxx is the model number. Make note of this number.

To clear any radio control remnants, reboot RSS from the System Settings window.

Open Terminal by double-clicking the black prompt icon in the Raspberry Pi Task Bar and type the following (3073 happens to be the model number for the Icom IC-7300):

```
rigctl -m 3073 -r /dev/ttyUSB0
```

This command assumes you have made no changes to the default settings in the radio. If you have changed Baud rate to 115,200, use this command:

```
rigctl -m 373 -r /dev/ttyUSB0 -s 115200
```

The resultant report should give more clues, which might simply be "Timed out." More diagnostic information can be obtained by using the "v" parameter such as below:

```
rigctl -m 214 -r /dev/ttyUSB0 -vvvvv
```

If nothing is learned, we need to check that the port is correct. Get a list of available ports by typing (lower-case L):

```
ls /dev/ttyU*
```

If more than one USB port is listed, try the rigctl commands with the other ports.

Once you are able to get rigctl started, a prompt "Rig command:" is shown. Type f followed by Enter and see if the reported frequency is correct. Type Ctrl+C to exit and stop the rigctl process.

If you are able to connect to and control the radio, we can start the RigPi using a test mode with the Test Radio button in Advanced Radio Settings.
Near the top you will see a line that reads "$tUser=$argv[1];" which we need to modify. Use the cursor arrow keys to move the insertion point to the front of $argv, then enter the characters 1;//.

Slightly further down, after "}else{," you need to change the variable $tUsername='admin'; so that is shows your username.

Type Ctrl+O to save the file and Ctrl+X to exit Nano.

Start hamlibDo by typing this line:

```
php hamlibDo.php
```

See if there are any error reported. If there don't appear to be any errors, open a RigPi browser and see if you can control the radio.

The report shown in Terminal includes the command to start rigctld. Try entering the complete line in Terminal and press Enter. See if there are any error reported.

If none of these steps gets the radio connected, it is time to check the USB cable and radio for problems. This can be done running a control program on another computer by moving the USB cable to that computer.

For a helpful guide providing additional information, here is a link to the Hamlib FAQ:

Hamlib FAQ

Frequency Display Flickers

The RigPi frequency readouts may flicker if radio control drops out intermittently. If using an Icom radio, put a check in Disable Split Polling in SETTINGS->Advanced Radio Settings. Restart the radio connection.

If your radio does not support CAT setting and reading of AF Gain, RF Gain, Power, or Mic Level, go to SETTINGS->Slider Overrides. Set the level for each slider to 0 to disable and hide that function on the Tuner and Keyer windows..

Radio Control Logging

The Test Radio function in Advanced Radio settings also starts a log for recording radio status and commands. You will find this log in /var/log/rigpi-radio.log. It is cleared each time you use the Test Radio function so only the most recent session is kept. You can use the edit program nano from the Raspberry Pi terminal to view the log.

```
sudo nano /var/log/rigpi-radio.log
```

Rotor Control Logging

The Test Radio function in Advanced Radio settings also starts a log for recording rotor status and commands. You will find this log in /var/log/rigpi-rotor.log. It is cleared each time you use the Test Radio function so only the most recent session is kept. You can use the edit program nano from the Raspberry Pi terminal to view the log.

```
sudo nano /var/log/rigpi-rotor.log
```

User Access Logging

A log of all users accessing RigPi can be found here:

```
sudo nano /var/log/rigpi-access.log
```

RigPi Audio Issues

No Audio

RigPi uses the optional MFJ RigPi Audio board for VoIP, digital modes, or even for a spectrum analyzer (panadapter). If RigPi Audio doesn't appear to be working, a number of tests can be use to isolate the problem.

RigPi Audio can receive/send audio through the RJ-45 connector on the USB end of the RigPi unit or from the 3.5 mm jack end. We will use the 3.5 mm jack end. If using the RJ-45 connection, remove that cable for now.

RigPi Audio uses a Linux device driver named snd_rpi_proto. All drivers and settings required for RigPi Audio are initially set and do not require changes.

Right-click the Speaker icon at the top of RSS Desktop to make sure snd_rpi_proto is shown as the selected device. If it isn't in the list, try rebooting RSS from the RigPi SETTINGS>System menu. If it fails to appear, the RigPi Audio board may have a problem.

To look for errors on booting, open RSS Terminal and type the following:

```
dmesg | grep audio
```

You will see a list of possible errors. The last line should say

[4.xxxxx] snd-rpi-proto soc:sound: wm8731-hifi <-> 3f203000.i2s mapping ok

which says the board is connected. If not, the RigPi Audio board probably needs repair.

Next we will try some audio tests using Linux programs through RSS Terminal.

Plug in a high impedance set of ear buds to the TX OUT connector. Type the following command (c2 says 2 channels):

```
speaker-test -c2
```

You should hear pink noise in the left ear bud, then silence, followed by pink noise.

Here is a tone test:

```
speaker-test -t sine -f 2000 -c2
```

You will hear a 2000 Hz tone in the left ear bud.

Finally, a voice test:

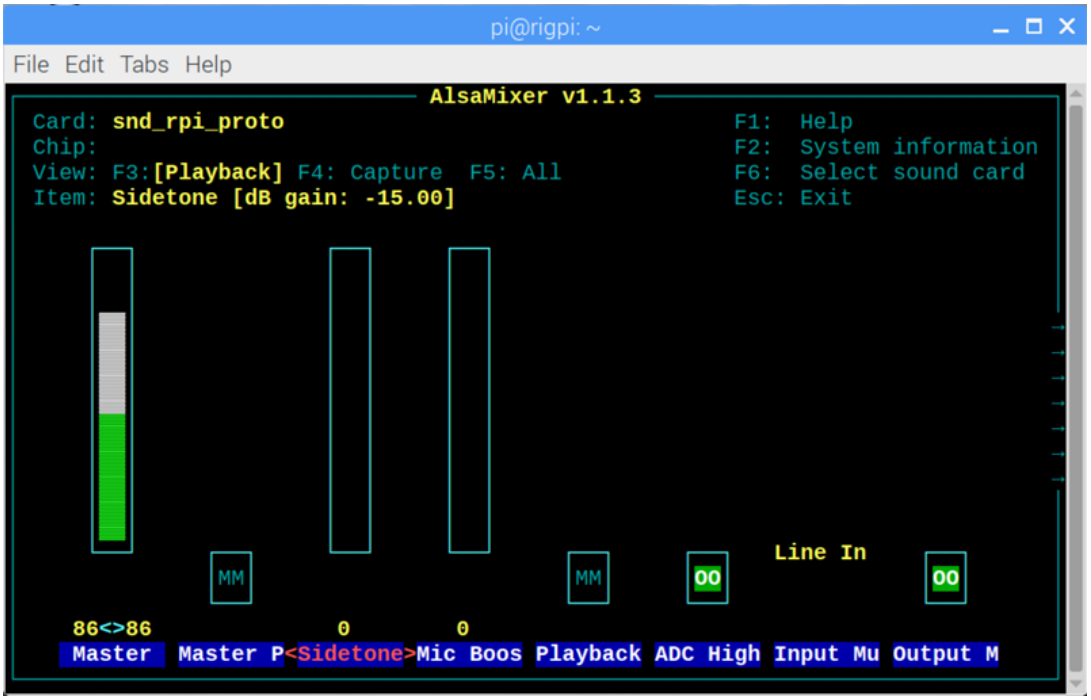
```
speaker-test -t wave -c2
```

You will hear a woman's voice in the left ear bud.

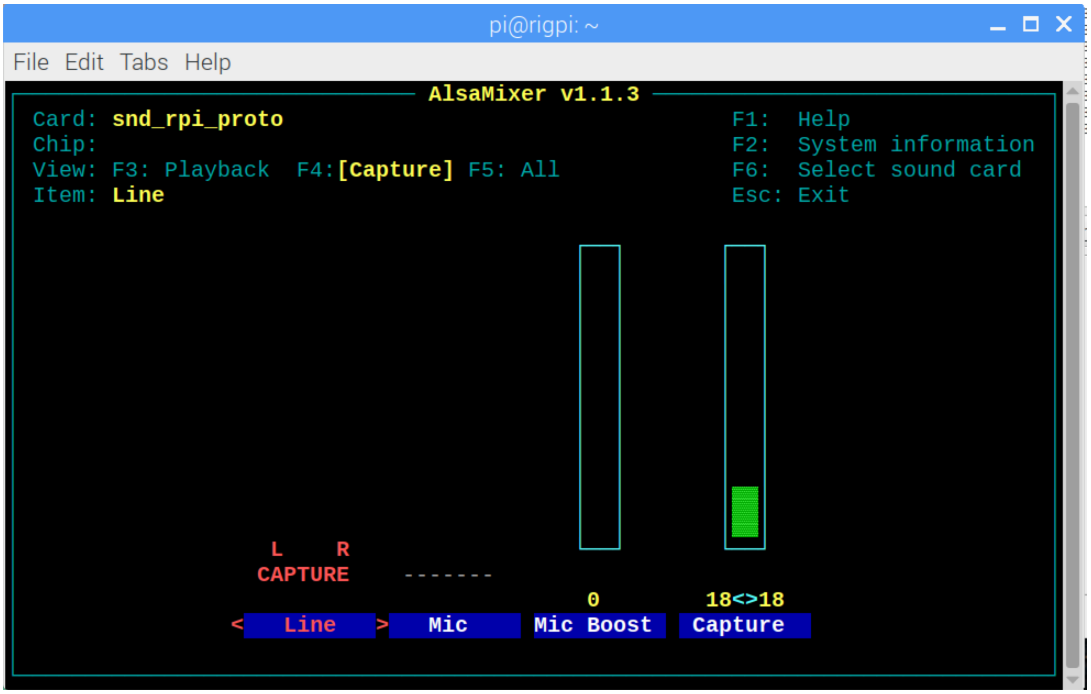
If any of these test fail, we can use the Linux program named Alsamixer from RSS Terminal to check the settings. Type

```
alsamixer
```

The following settings are used for RigPi Audio:



Master Gain	86<>86 (adjust to suit)
Master Playback	OFF (MM)
Sidetone (not radio sidetone)	0
Mic Boost	0
Playback De emphasis	OFF (MM)
ADC High Pass Filter	ON (OO)
Input Mux	Line In
Output Mixer HiFi	ON (OO)



Line	L R Capture
Mic Boost	0
Capture	18<>18 (adjust to suit)

Can't connect to Mumble server

Mumble server starts automatically when RigPi boots. First we can make sure Mumble server is actually running, then we'll check the Mumble log.

To confirm the Mumble is running:

In Terminal, type:

```
ps -ef | grep mumble-server
```

The command should show:

```
mumble-+  582   1 0 12:22 ?    00:00:00 /usr/sbin/murmurd -ini /etc/mumble-server.ini
```

The results confirm that the murmur (mumble server) daemon is running, using the mumble-server.ini initialization file.

To make sure we can connect to the default Mumble port, type:

```
nc -vz rigpi4.local 64738
```

You should see this response:

Connection to rigp4.local 64738 port [tcp/*] succeeded!

If these tests are successful, we can check the Mumble server log. Type:

sudo cat /var/log/mumble-server.log

Here is the response:

```
...
<W>2019-01-23 12:22:25.792 Initializing settings from /etc/mumble-server.ini (basepath /etc)
<W>2019-01-23 12:22:25.815 Meta: TLS cipher preference is "ECDHE-ECDSA-AES256-GCM-SHA384:ECDHE-RSA-AES256-GCM-SHA384:ECDHE-ECDSA-AES128-GCM-SHA256:ECDHE-RSA-AES128-GCM-SHA256:AES256-SHA:AES128-SHA"
<W>2019-01-23 12:22:25.815 OpenSSL: OpenSSL 1.1.0j 20 Nov 2018
<C>2019-01-23 12:22:25.850 Successfully switched to uid 116
<W>2019-01-23 12:22:28.784 ServerDB: Opened SQLite database /var/lib/mumble-server/mumble-server.sqlite
<W>2019-01-23 12:22:28.814 Resource limits were 0 0
<W>2019-01-23 12:22:28.814 Successfully dropped capabilities
<W>2019-01-23 12:22:33.835 OSInfo: Failed to execute lsb_release
<W>2019-01-23 12:22:37.123 Murmur 1.2.18 (1.2.18-1) running on X11: Linux 4.14.79-v7+: Booting servers
<W>2019-01-23 12:22:45.343 1 => Server listening on [::]:64738
<W>2019-01-23 12:23:32.814 1 => Announcing server via bonjour
<W>2019-01-23 12:23:33.002 1 => Registration needs nonempty 'registername', 'registerpassword' and 'registerurl', must have an empty 'password' and allowed pings.
<W>2019-01-23 12:23:33.003 Object::connect: No such slot MurmurDBus::userTextMessage(const User *, const TextMessage &)
```

If connection attempts have been made they are included at the end of the log. Check these lines for an indication of why the connection was not made.

If you see "Connection refused" in the Mumble status column, try logging in with a different user name. User names must be unique. You can't use names like W6HN two times, but you can use W6HN and W6HN-1 to make them unique.

Mumble gives access to more settings through an account named SuperUser. Try logging in using that username with password 7388.

Finally, visit the Mumble Help pages to additional help. Here is a link to the instructions for logging into a Mumble server:

Mumble Help

RigPi Audio Input Level Too Low

RigPi audio can be high level line-input of up to 2-volts peak-to-peak, or low level microphone input (200-mV peak-to-peak). In addition, the input levels can be adjusted. These settings are done through Alsamixer. See the Alsamixer topic in Other Programs.

Audio Feedback when Transmitting

A second audio path can cause transmit feedback. Turn off the Mon function in your radio. There may be a hidden menu item for Line Out Mon or USB Audio Mon, depending on your radio. Make sure your Mic isn't picking up audio. Turn the Mic Gain on your radio to 0. Menu settings can also be used to mute the microphone.

Remote RigPi Won't Connect to Radio RigPi

If a remote RigPi fails to connect to the radio RigPi, here are some things to try.

In remote RigPi, check the R Port and Keyer Port in Advanced Settings. You should see the <ip>:<port> for the radio RigPi. The remote radio should be your physical radio, such as Icom 7300. The Keyer should be via CAT.

If operating from a remote location, use the WAN IP for the network the radio RigPi is using. Open port 453x in your home Router. The port to open will depend on which account you are trying to connect to. For account 1, use 4532. If it is account 2, <port> will be 4534.

Use Terminal in the remote RigPi Desktop and attempt to connect from there using the command:

```
rigtcl -m 2 -r <IP>:<port>
```

Once connected you will see a Command prompt. Enter f (to get frequency) followed by the Enter key.

If that fails, try through Terminal on the radio RigPi.

These steps should give you an indication of where the problem lies.